BROOKLYN BOTANIC GARDEN

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EDITED BY

C. STUART GAGER

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THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES

BROOKLYN BOTANIC GARDEN RECORD

VOL. XI January, 1922 No. 1

PROSPECTUS, 1922

I. COOPERATION WITH LOCAL SCHOOLS

The Brooklyn Botanic Garden aims to cooperate in every practicable way with the public and private schools of Greater New York on all matters relating to the study of plants. The purpose of the Garden in this connection is to supplement and enrich the school work in the way of instruction, demonstration, study, material, etc., which would not otherwise be available.

A. Talks at Schools.—The principals of public or private schools may arrange to have lantern talks given at the schools on various topics related to nature study, such as garden work with children, tree planting, and Arbor Day. If an illustrated lecture is desired, the lantern and operator must be provided by the school, but slides will be furnished by the Botanic Garden. Address the Curator of Elementary Instruction for list of talks and for appointments.

B. School Classes at the Garden.—(*a*) Schools not provided with a stereopticon may arrange for classes, accompanied by their teachers, to come to the Botanic Garden for lectures either by the teacher or by a member of the Garden Staff.

(*b*) Notice of such a visit should be sent at least *one week* previous to the date on which a talk is desired. These talks will be illustrated by lantern slides, and by the conservatory collection of useful plants from the tropics and subtropics. Spring and fall announcements of topics will be issued during 1922.

(*c*) The Garden equipment, including greenhouse, plant material, lecture room, lantern, and slides, is at the disposal of teachers who desire to instruct their own classes at the Garden. Arrangements must be made in advance with the Curator of Elementary Instruction, so that such work will not conflict with other classes and lectures.

(*d*) The principal of any elementary or high school in Brooklyn may arrange also for a series of six lessons on plant culture to be given during the fall or spring to a class. These lessons will be worked out for the most part in the greenhouse. Such a course must be arranged for in advance, and the class must be accompanied by its teacher. Adapted for pupils above the fourth grade.

C. Home Gardening.—Assistance will be given to children in planning and planting home gardens. Enrolment cards for such assistance may be obtained on application to the Curator of Elementary Instruction. Prizes will be offered to both schools and individuals at the annual Children's Garden Exhibit for the best results in home gardening. This exhibit is open to all children in the city of Brooklyn, although their garden products may have been raised at their summer homes. *Certifications must be made that the work has been done by the child himself.*

The exhibit for 1922 will be held on *Friday* and *Saturday, September 29* and *30*. All exhibits, of schools as well as of individuals, must be brought to the Brooklyn Botanic Garden before 12 o'clock, *Friday, September 29*. The exhibit will be judged at 1 o'clock on that afternoon, and will be open for public schools at 2 p.m., Friday, when classes are invited to come with their teachers. The exhibit will be open to the general public on Friday afternoon and on Saturday from 10 to 4. After 4 o'clock on Saturday afternoon the exhibitors may remove their exhibits. Prizes will be presented on Saturday afternoon, *October 14*, at 2:30 o'clock.

Gold and bronze medals will be awarded as first and second prizes for individual exhibits. A trophy is the first prize for the school making the best exhibit as a whole. A bronze loving cup is another trophy given for the best school box display. Each trophy is to be competed for annually until one school wins it three times, when it will become the property of that school. A new prize will then be offered.

D. Penny Packets of Seeds.—In order to assist the above work, penny packets of seeds are put up by the Botanic Garden for children's use. In the early spring, lists of these seeds, conditions for entry as an exhibitor, home gardening record cards, and other information may be secured on application to the Curator of Elementary Instruction.

E. Conferences.—Conferences may be arranged by teachers and principals for the discussion of problems in connection with gardening and nature-study. The first Monday afternoon of each month will be reserved for such conferences; appointments must be made in advance. Address Miss Ellen Eddy Shaw.

F. Study and Loan Material.—On request, the Garden will endeavor to provide living seedlings or plant parts for study, to the extent of its facilities. Teachers may arrange to have various physiological experiments or demonstrations conducted at the Garden. Petri dishes, which must be cleaned and delivered to the Garden, will, on request, be filled with nutrient agar, ready for exposure in the study of bacteria and molds. In all cases arrangements must be made by teachers for calling for such material, and all material loaned by the Garden must be returned promptly in good condition.

During the fall and spring the Botanic Garden will be able to arrange for a limited number of loan exhibits to public schools of living and herbarium material of spring wild flowers and weeds and of fall wild flowers and weeds. Applications should be sent to Miss Ellen Eddy Shaw one week before the exhibit is desired.

Four sets of lantern slides have been prepared for loan on the following subjects:

1. Plant Life
2. Spring Wild Flowers
3. Common Trees
4. Rice Culture

II. PUBLIC LECTURES

Spring Lectures

Fridays at 4: April 7–28

1. April 7. The Cultivation of Woodland Flowers. Mr. Nor-

man Taylor, Curator of Plants, Brooklyn Botanic Garden.

2. April 14. English Gardens. Miss Hilda Loines, President of the Women's Auxiliary, Brooklyn Botanic Garden.

3. April 21. American Forests and the Necessity for Regrowth. Professor J. W. Toumey, Dean, Yale School of Forestry, New Haven, Conn.

4. April 28. The Civic Value of Botanic Gardens. Dr. C. Stuart Gager, Director, Brooklyn Botanic Garden.

Fall Lectures

Saturdays at 4: October 7–28

1. October 7. A Garden Pilgrimage in England. Mr. Montague Free, Horticulturist and Head Gardener, Brooklyn Botanic Garden.

2. October 14. Bulb Planting. Miss Ellen Eddy Shaw, Curator of Elementary Instruction, Brooklyn Botanic Garden.

3. October 21. Four Seasons in the Garden. Mr. Leonard Barron, Editor of the Garden Magazine, Garden City, L. I.

4. October 28. Health and Disease in Plants. Dr. Arthur Harmount Graves, Curator of Public Instruction, Brooklyn Botanic Garden.

Motion Pictures for Children

Arrangements are under way for the presentation of motion pictures illustrating various phenomena of plant life. These pictures will be shown on Saturday mornings in the spring. More detailed information will be issued later.

III. COURSES OF INSTRUCTION

A. Children's Gardens: Nature Study

1. *Courses for Children*

The following courses are open to all boys and girls. Enrolment in these courses entitles the boy or girl to membership in the Boys' and Girls' Club of the Brooklyn Botanic Garden. This club.

having a membership of nearly 1,000, meets four times a year for discussion of subjects related to plant life. Papers on various botanical subjects are read at these meetings, and the speakers are then entitled to a silver pin, providing they have pursued a period of study at the Garden extending over at least six months.

A1. The Beginners' Garden.—Open annually to 50 boys and girls who have never had instruction in gardening at the Brooklyn Botanic Garden. This course takes up the subject of the small garden, what to plant, how to plant it, care, replanting, etc. *Application for plots should be made in person or in writing before March 1.* Size of plots 8 ft. by 10 ft. All crops belong to the individual. *Fee, twenty-five cents. Saturday* mornings, 9–12, *April 8 to September 30.* Miss Hammond and assistants.

A2. Second Year Gardens.—Open to 50 boys and girls who have had one or more seasons at the Brooklyn Botanic Garden—a continuation of Course A1. Registration should be made before September 1 of each year for the following year. *Fee, twenty-five cents. Saturday* mornings, 9–12. *April 8 to September 30.*
Miss Blank.

A3. Junior Garden Assistants.—Open to older boys and girls, or to those who have mastered Courses A1 and A2. Size of plot 10 ft. by 20 ft. *Fee, fifty cents.* These gardens are for the raising of vegetables. The work is in the nature of a project, "How much can one raise on a plot 10 ft. by 20 ft.?" Hours to be arranged. The student must put in at least two periods a week during the summer vacation, and, if possible, three. Registration date: *April 8.* Miss Hammond and assistant.

A4. Preparation for the Outdoor Garden.—The following classes are open to boys and girls during the spring of each year. The courses are planned for a better understanding of plant life and so that the outdoor garden may become a more intelligent piece of work. Classes are limited to fifteen. The *fee* for each course is *fifteen cents* to cover the cost of material.

Boys' Spring Course.—(*a*) *Saturday* mornings, 9–10:15, *February 4 to March 25.* (*b*) *Saturday* mornings, 10:30–11:30, *February 11 to March 25.*

Girls' Spring Course.—(*a*) *Saturday* mornings, 9–10:15, *February 11 to March 25.* (*b*) *Saturday* mornings, 10:30–11:30, *February 11 to March 25.* Miss Hammond, Miss Blank.

A5. Advanced Work for Older Boys and Girls.—How to raise plants, mix soils, transplant, start seedlings for outdoor gardens, etc. Boys and girls who have taken spring courses under A4 are eligible for advanced work. The *fee* for the course is *twenty-five cents.* Each student may take home his plants and seedlings. This course is open to both boys and girls over twelve years of age. *Saturday* mornings at 9:30, *February 11 to March 25.*

Miss Shaw.

A6. Advanced Nature Work.—A course designed for those older boys and girls who have taken Courses A1–A5. Plant collections will be made and the simpler principles of plant classification studied. Projects will be assigned to individuals. *Open only to pupil assistants of the Garden.* Hours to be arranged.

Miss Shaw.

A7. Fall Greenhouse Work.—The following courses are self-explanatory and are for both beginners and advanced students:

Class A.—Open to boys and girls who have been in at least two fall bulb classes before this. This class is for advanced work. The bulbs used will be hyacinth, tulip, narcissus, oxalis. Geranium cuttings and primroses will also be used. Time of class, 10:30, *Saturday* mornings. *Fee, fifteen cents. October 21 to November 25.* Miss Hammond.

Class B.—Open to boys and girls who have never taken any greenhouse work before. Bulbs used: narcissus, oxalis, primrose; also geranium cuttings. *Saturday* mornings at 9:15. *Fee, fifteen cents. October 21 to November 25.* Miss Hammond.

Class C.—Open to boys and girls over thirteen years of age. Subjects studied: hyacinth, Easter lily, calla lily, the botany of common cultivated plants, etc. *Fee, twenty-five cents. Saturday* mornings at 10, *October 21 to November 25.* Miss Shaw.

Class D.—Subject: basketry. Open to boys and girls 11 years old and over. *Saturday* mornings at 9. *Fee, twenty-five cents. October 21 to November 25.* Miss Blank.

Class E.—Open to any boy or girl. Subject: the making of garden Christmas presents. There will be a choice of gifts. Some

of the articles made will be the following: a basket, seed packet, flower book-mark, painted pot and plant to go in it, calendar, pot of sweet peas, wooden box with flower design, one article made in the woodwork shop. *Saturday* mornings at 10:30. *Fee, twenty-five cents. October 21 to November 25.* Miss Blank.

A8. Junior Gardeners' Course.—A course for boys 14–17 years of age. Lessons given in the care of border and other flower beds, in the weeding and care of small vegetable gardens, in mowing and watering lawns, repotting plants, etc. This is planned to fit boys for summer work and to enable them to obtain positions. Hours to be arranged. *Fee, fifty cents.* Practical work with the gardeners and foreman, under the supervision of Miss Shaw.

A9. Nature Study for Boy Scouts, Girl Scouts, Camp Fire Girls, Scout Leaders, and Others.—Short courses of at least four periods each, with talks, demonstrations, and field trips in the grounds of the Botanic Garden and Prospect Park to study trees, shrubs, etc. The instruction will be adapted to meet the needs of the various groups that apply. *Open only to groups of at least ten persons.* Hours to be arranged. Dr. Graves, Miss Hammond, and assistants.

A10. Special Work for High School Pupils.—A course in gardening or greenhouse work adapted for high school pupils. Classes to be arranged for by the high school teacher. Miss Shaw.

2. *Courses for Teachers*

The following brief courses are designed primarily for teachers who wish to gain some knowledge of nature study and gardening for use in their school work, without taking the longer courses described under B, page —. It should be noted that only the latter courses are accepted by the Board of Education for teachers' credits.

A21. Greenhouse Work for Teachers.—Do you wish to learn how to raise plants for the school garden or your own garden? This course is a practical one and almost the entire work is done in the greenhouses. All of the seedlings raised belong to the student. *Open to beginners only.* Students who have taken this course, and who wish to continue the work, although not admitted to the class, may arrange for an assignment of space in the green-

house. Six lessons. *A fee of one dollar* will be charged to cover cost of materials. *Tuesdays,* 4 p.m., *February 14 to March 21.*
Miss Shaw.

A22. The School Garden.—A series of four practical lessons and demonstrations on the school garden; how to lay it off, plant it, kinds of seeds to use, school garden management, etc. *Fee, fifty cents,* to cover cost of materials. *Tuesdays,* 4 p.m., *March 28 to April 18.*
Miss Shaw.

A23. Spring Nature Study for the Classroom.—This course of four lessons will acquaint the teacher with common nature-study material which may be taken into the classroom during the spring-time. Demonstration materials will be given to members of this class. The work will be based on the syllabus of nature study for the schools of New York City and will be entirely practical. *No fee will be charged* for this course. *Thursdays,* 4 p.m., *May 4–25.*
Miss Hammond.

A24. Fall Garden Work.—Three lessons on bulbs; how to plant them, their use in the classroom. *Fee, one dollar. Mondays,* 4 p.m., *October 16–30.*
Miss Shaw.

A25. Fall Nature Study.—This course is a complement to the spring nature-study work and the material used will be the common material one would use in classroom work, showing seed dispersal, evergreens, deciduous trees, etc. Such subjects as Nature's preparation for winter will be covered. Three lessons. *Mondays,* 4 p.m., *September 18 to October 2.*
Miss Hammond.

B. Courses for Teachers of Children's Gardening and Nature Study

The course for teachers in children's garden work is planned not only to prepare for garden work, but for the teaching of nature study as well. Our courses are so arranged that they emphasize not only the theory of each subject, but its actual practice, either in class-room, greenhouse, garden, or field. At the same time the work is correlated to meet the needs of each grade of the elementary school. There is an increasing demand for good nature-study work in our schools, and we make a special point of giving simple, definite, helpful work, grading it so that it applies directly to the immediate

needs of our own city schools. Practice is given in all this work with classes of children of different ages. The requirements for entrance are a certificate from a city training or normal school, a college diploma, or several years of certified successful teaching. These courses may be completed during one year, or, as in the case of city school teachers, may extend over a period of two or more years. The *fee for the entire course is twenty-five dollars,* payable in full at the time of registration, or course by course as they are covered. No money will be refunded if the student drops the work, and no monetary allowances will be made for courses taken at other institutions, although time allowances will be made.

Special stress is put upon the outdoor garden practice. This practice is of two kinds: (1) Practice with children. There are over two hundred children in our outdoor garden, and every opportunity is given for the student to become accustomed to handling children and for working out problems connected with this phase of the work. (2) Practice in the teacher's garden. Each student has a garden of her own and works it herself, thus performing all gardening operations to be taught later to children.

To those who satisfactorily complete this course a certificate will be given. *The courses offered in children's gardening are considered as a unit.*

These courses have been accepted by the Board of Education for teachers' credits as follows:

1. Any of the courses will be accepted toward meeting clause "b" of the conditions of eligibility for high school license in Biology.

2. The course in Pedagogy of Botany and Educational Principles of Children's Gardening (**B4**) will be accepted as a satisfactory 30-hour course in Pedagogy toward meeting the requirement of 60 hours' work in Pedagogy in lieu of the written test in Principles and Methods of Teaching for Promotion License.

3. This course will be accepted as a pedagogical course, and either of the other four courses will be accepted as an academic course toward meeting the conditions of exemption from the academic paper in the examination for license as assistant to principal. Such exemption is granted to those who offer 120 hours

of satisfactory work, 60 of which must be in the Science of Education and 60 in some branch of literature, science or art, such 120 hours' work not being accomplished wholly within one academic year.

These courses have been accepted by the Brooklyn Teachers' Association and appear in the syllabus of courses.

The individual student may apply at any college for credits on these courses, which will be granted according to individual merit.

B1. General Botany.—Thirty sessions. A course designed to make clear the fundamental morphological and physiological principles of botany. With a view to correlation with the other courses described below, emphasis is laid upon the higher plants, particularly their classification and physiology, and in connection with the latter subject a consideration of plant diseases from a practical as well as theoretical viewpoint is also included. *Fee, five dollars. Wednesdays,* 4 p.m., beginning *September 27.* Dr. Graves.

B2. Nature Study.—Thirty sessions. This course covers the plant material used in nature-study teaching, and includes the identification of the common trees, shrubs, plants, wild flowers, and weeds. Mounts, charts, and diagrams are made. The student becomes familiar with the actual material. The course is entirely practical, work being done in both field and laboratory. Two hours of such work are weighted as one hour. *Fee, five dollars. Tuesdays,* 4 p.m., beginning *September 26.*

Miss Hammond.

B3. Principles of Agriculture and Horticulture.—Thirty sessions. This course will be especially helpful to teachers. The principles of horticulture are considered and applied in a practical way through greenhouse, laboratory, and lecture work. The greenhouse work includes the following subjects: plant propagation by means of bulbs, rhizomes, roots, seeds, etc.; the care of the greenhouse; home plants; window-box materials; fertilizers. Insect and fungous pests, grafting and pruning are also included from both a practical and a theoretical point of view. *Fee, five dollars. Wednesdays,* 4 p.m., beginning *September 27.*

Miss Shaw and Mr. Free.

B4. Pedagogy of Botany and Educational Principles of Children's Gardening and Nature Study.—Thirty sessions. Discus-

sion of the mental processes involved in learning and in teaching science and the fundamental principles which underlie and point the way to laboratory and field work. After this a course of study in gardening and nature study, based on the school syllabus, is worked out and the basic psychological and pedagogical principles discussed. This course includes all the modern phases of the subject and is so arranged that it may be taken directly into classroom work. Gardening as a factor in the work of Americanization is the keynote. *Fee, five dollars. Thursdays,* 4 p.m., beginning *September 28.* Dr. Gager and Miss Shaw.

B5. Garden Practice.—Thirty sessions. This course is entirely practical and includes all the outdoor work of the student in his own garden, applying the principles of agriculture and gardening, work with children in the garden, basketry and woodwork. Three hours of outdoor practice count as one credit hour. Ninety hours is the minimum in this course, but students may profitably put in a greater number of hours to the maximum of 630 hours, or seven credits. *Fee, five dollars. Tuesdays,* 4 p.m., beginning *September 26.* Miss Shaw.

C. Courses for the General Public

Courses C1–C9 are *free to members of the Botanic Garden,* and, except where otherwise specified, are also free to the general public, both men and women. Registration should be made with the instructor in person or by mail at least one week before the course opens, in order that adequate material, etc., may be provided. No course will be given when less than six apply.

C1. Plants in the Home.—How to Grow Them. Five talks with demonstrations. Practice in potting, mixing soils, making cuttings, etc. This course deals with the principles to be followed in raising plants. The members of the class have the privilege of keeping the plants they have raised. *Fee, one dollar. Thursdays,* 4 p.m., *February 2 to March 2.* Mr. Free.

C2. Planning the Garden.—Four lessons. Arrangement of flowers to secure continuous bloom; color schemes; planting of trees, shrubs, and plants to best advantage; cropping plans to provide a succession of vegetables throughout the year. *No fee. Thursdays,* 4 p.m., *March 9–30.* Not given in 1922.

C3. The Flower Garden.—Making the most of it. Five lessons. How to improve soils and get results from planting; old-fashioned flowers; annuals; summer bedding; vines for screening unsightly objects; rose culture; growing of ornamental shrubs; pruning; how to make a lawn and keep it up. *Fee, one dollar.* Not given in 1922. Mr. Free.

C4. Gardening in the Fall.—Six lessons. How to make cuttings; planting of bulbs; care of tender plants; how and what to grow. *Fee, one dollar. Thursdays,* 4 p.m., *September 28 to November 2.* Mr. Free.

C7. Plant Families.—Four illustrated lectures on the characters of the main groups and important families of the higher plants, followed by visits to the conservatories: (1) Plant classification from the Greeks to the present; (2) Clubmosses, ferns, and conifers; (3) Dicotyledons; (4) Monocotyledons. *Fee, one dollar. Fridays,* 4 p.m., *March 3–31.* Dr. Gundersen.

C8. Spring Flowers and Ferns.—Eight outdoor lessons in the botanic garden, noting the plants as they flower. A hand lens is desirable. *Fee, one dollar.* Free to those who have taken Course C7. *Fridays,* 4 p.m., *May 5 to June 23.* Dr. Gundersen.

C9. Trees and Shrubs of Brooklyn and Vicinity.—Ten outdoor lessons at the Garden or elsewhere in Greater New York. How to gain a ready acquaintance with the common trees and shrubs of the eastern United States well represented in this region. Consideration of each species in systematic order and the features by which they may be most easily recognized; also habits, rate of growth, economic value and use, methods of planting and propagation; importance in forestry, horticulture, or landscape art. *Fee, one dollar. Saturdays,* 2 p.m., *April 8 to June 10.* Dr. Graves.

D. Course for the Training of Gardeners

The following course for the training of gardeners is planned to meet the needs of students of the Federal Board for Vocational Education, but is open to all who meet the necessary requirements.

Requirements:

Age.—At least 18.

Personality.—To be satisfactory to Botanic Garden authorities.

Education.—Schooling through at least the first two years of high school, or its equivalent in experience and general intelligence, to be decided by personal conference.

Enrolment.—Students may, for the present, enter the course at any time.

Continuation.—Students who give evidence that they are not likely to succeed in gardening will not be allowed to continue the course.

Vacations.—Four weeks distributed throughout the year.

First Year

First Quarter

1. Garden and Greenhouse Practice.—Five days a week; hours 9–12, 1–2:30.

Care of tools, care of cold frames, making a hotbed, seed sowing, transplanting, lawn making, hoeing and cultivating, spraying for insect and fungous pests, watering, winter protection of plants, manuring, harvesting and storing, staking and tying, supports for climbing plants, pruning, and repair of trees, propagation by seeds, cuttings, layers, budding and grafting; care of rock garden, perennial garden, bedding plants, aquatic garden, wild garden; making up window boxes and hanging baskets; transplanting trees and shrubs, etc.

Greenhouse.—Watering, ventilating, shading, cleaning plants of insect pests, potting, heating, practice with special crops, orchids (planting and general care); chrysanthemums (potting and general care); ferns, palms, *Primula, Cyclamen,* etc.

2a. Elementary Botany.—Plant structure and function. Twice a week.

3. Soils and Fertilizers.—Once a week.

4. Inspection of the Plantations and Plant Houses Under Guidance.—Study of plant materials. Once a week.

5. Special Lectures and Conferences.—Saturdays.

6. Assigned Readings and Reports.—Once a week.

Second Quarter

1. **Garden and Greenhouse Practice** (continued).

2a. **Elementary Botany.**—Plant structure and function (continued). Once a week.

4. **Inspection of the Plantations and Plant Houses Under Guidance** (continued).—Once a week.

5. **Special Lectures and Conferences.**—Saturdays.

6. **Assigned Readings and Reports.**—Once a week.

7a. **Animal Friends and Foes in the Garden.**—Once a week.

8a. **Fungous Diseases of Plants.**—Once a week.

Third Quarter

1. **Garden and Greenhouse Practice** (continued).

2b. **Elementary Botany.**—Classification, identification of plants. Once a week.

4. **Inspection of the Plantations and Plant Houses Under Guidance** (continued).—Once a week.

5. **Special Lectures and Conferences.**—Saturdays.

6. **Assigned Readings and Reports.**—Once a week.

9. **Principles of Horticulture.**—Once a week.

10. **Trips to Nurseries, Private Places and Other Gardens Under Guidance.**—Once a month.

11. **Plant Relations.**—Once a week for six weeks.

Fourth Quarter

1. **Garden and Greenhouse Practice** (continued).

2b. **Elementary Botany.**—Classification, identification of plants (continued). Once a week.

4. **Inspection of the Plantations and Plant Houses Under Guidance** (continued).—Once a week.

5. **Special Lectures and Conferences.**—Saturdays.

6. **Assigned Readings and Reports.**—Once a week.

9. **Principles of Horticulture.**—Once a week.

10. **Trips to Nurseries, Private Places and Other Gardens Under Guidance.**—Once a month.

12. **Garden Carpentry.**—Once a week.

Second Year

First Quarter

1. **Garden and Greenhouse Practice** (continued).

4. **Inspection of the Plantations and Plant Houses Under Guidance** (continued).—Once a month.

5. **Special Lectures and Conferences.**—Saturdays.

6. **Assigned Readings and Reports.**—Once a week.

10. **Trips to Horticultural Exhibits, Nurseries, Private Places and Other Gardens Under Guidance.**—Once a month.

13. **Garden Planning.**—Once a week.

14. **Floriculture.**—Once a week.

15. **Vegetable Growing.**—Once a week.

16. **Floral Decoration.**—Once a month.

Second Quarter

1. **Garden and Greenhouse Practice** (continued).

4. **Inspection of the Plantations and Plant Houses Under Guidance** (continued).—Once a month.

5. **Special Lectures and Conferences.**—Saturdays.

6. **Assigned Readings and Reports.**—Once a week.

8b. **Fungous Diseases of Plants.**—Advanced course. Once a week for six weeks.

10. **Trips to Horticultural Exhibits, Nurseries, Private Places and Other Gardens Under Guidance.**—Once a month.

14. **Floriculture** (continued).—Once a week.

15. **Vegetable Growing** (continued).—Once a week.

16. **Floral Decoration.**—Once a month.

17. **Plant Breeding.**—Once a week for six weeks.

Third Quarter.

1. **Garden and Greenhouse Practice** (continued).

4. **Inspection of the Plantations and Plant Houses Under Guidance** (continued).—Once a month.

5. **Special Lectures and Conferences.**—Saturdays.

6. **Assigned Readings and Reports.**—Once a week.

7b. Animal Friends and Foes in the Garden.—Advanced course. Once a week for six weeks.

10. Trips to Horticultural Exhibits, Nurseries, Private Places and Other Gardens Under Guidance.—Once a month.

14. Floriculture (continued).—Once a week.

16. Floral Decoration.—Once a month.

18. Types of Gardens.—Once a week.

19. Road and Walk Making; Use of Cement in Garden Structures.

Fourth Quarter

1. Garden and Greenhouse Practice (continued).

4. Inspection of the Plantations and Plant Houses Under Guidance (continued).—Once a month.

5. Special Lectures and Conferences.—Saturdays.

6. Assigned Readings and Reports.—Once a week.

10. Trips to Horticultural Exhibits, Nurseries, Private Places and Other Gardens Under Guidance.—Once a month.

16. Floral Decoration (continued).—Once a month.

20. Window Boxes, Hanging Baskets, Wardian Cases, etc.—Once a week for six weeks.

21. Greenhouse Construction.—Once a week for six weeks.

22. Plant Forcing.—Once a week.

Principles of Pruning.—Once a week for six weeks.

For final certification one year's satisfactory experience will be required, under direction, in an accepted commercial or private garden.

E. Advanced Courses and Investigation

For the following advanced and research courses there is a charge covering all expenses, including laboratory fee, of *$30 for each full course* of 100 credit hours, and *$20 for each half course* of 50 credit hours.

1. *Advanced Courses*

E1. Mycology and Plant Pathology.—Morphology and pathology of the fungi and bacteria. Life histories of fungi; methods of control of plant diseases, etc. Prerequisite, a satisfactory col-

lege course in general botany. 100 credit hours of work. Hours to be arranged. Dr. Graves.

E2. Experimental Evolution.—Detailed studies of the nature and causes of variation and heredity. Some of the subjects considered are: Historical Résumé of the Evolution Theory, Physical Basis of Inheritance, Inheritance of Acquired Characters, Kinds and Causes of Variation, Mendelism, Biometry, Principles and Technique of Plant Breeding. This course is open to students of college rank with a knowledge of the elements of physics, chemistry, geology, botany, and zoology. The work is primarily intended for students in pure science and for agricultural or horticultural students fitting themselves for various professional activities in these particular fields. Three lectures and two laboratory periods a week. 100 credit hours of work. Hours to be arranged. Not offered in 1922. Dr. White.

E3. Phytogeography.—A course dealing with plant distribution over the earth. Prerequisites are courses in plant ecology and geology, and a good general knowledge of climatology and systematic botany. 50 credit hours of work. Hours to be arranged. Mr. Taylor.

E4. Systematic Botany.—The collection, identification, and classification of the higher plants. Studies of the collections on the grounds, in the conservatories, and in the herbarium. Hours to be arranged. Dr. Gundersen.

E5. Seminar and Journal Club.—Monthly meetings of the Garden staff and advanced students for the discussion of the scientific and educational work carried on at the Garden, and for the review of recent outstanding investigations or publications which have conspicuously contributed to the advancement of botanical knowledge.

*2. Investigation**

E6. Research in Mycology and Plant Pathology.—Independent investigation of problems relating to fungi and fungous diseases of plants. Dr. Reed.

*Courses of graduate rank offered by the Botanic Garden, when approved by the Faculty of the Graduate School of New York University, are listed as courses in the Graduate School, and are given the same credit as other graduate courses. Properly qualified students who take these

E7. Research in Plant Genetics.—Independent investigation of problems of variation and heredity, including that phase of cytology having a direct bearing on the subject matter of genetics. Offered in the fall of 1922. Dr. White.

E8. Research in Plant Geography and Ecology.—Independent investigation of problems in plant geography and ecology. Mr. Taylor.

E9. Research in Forest Pathology.—Independent investigation of the diseases of woody plants. Dr. Graves.

IV. OTHER EDUCATIONAL FEATURES

Plantations

The plantations comprise several sections, including the local flora (native wild flower garden), general systematic (trees, shrubs and herbaceous plants not native within 100 miles of Brooklyn), morphological, ecological, economic, and rock gardens, Japanese garden, and children's gardens. As noted below, under *Docentry,* arrangements may be made for viewing the plantations under guidance. They are open free to the public daily from 8 a.m. until dark; on Sundays and holidays from 10 a.m. until dark.

Conservatories

The Garden conservatories contain a collection of tender and tropical plants. Of special interest for teachers of nature study and geography is the economic house, containing useful plants from the tropics and subtropics, including the following: banana, orange, lemon, lime, citron, kumquat, tangelo (a cross between the grape-fruit—pomelo—and the tangerine), West Indian cedar (the source of the wood used for cigar boxes), eucalyptus, Manila hemp, sisal, pandanus (source of the fiber used for making certain kinds of fiber hats), fig, grape vines from north and south Africa, date palm, cocoanut palm, chocolate tree, coffee, tea, cam-

courses may present them in satisfaction of the requirements for advanced degrees given by the University. Graduate credit has also been allowed elsewhere for such advanced work done at the Garden.

phor, ginger, sugar cane, avocado (so-called "alligator pear"), Para and other rubber plants, banyan, religious fig of India, and numerous others.

The Conservatories are open April 1 to November 1, 10 a.m.–4:30 p.m. (Sundays, 2–4:30); November 1 to April 1, 10 a.m.–4 p.m. (Sundays, 2–4).

Herbarium

The Garden herbarium consists at present of over 150,000 specimens, including phanerogams, ferns, mosses, liverworts, lichens, parasitic and other fungi, algae, and myxomycetes. This collection may be consulted from 9 a.m. until 5 p.m. by those interested, and specimens submitted will be gladly identified.

Library

The rapidly growing library of the Garden comprises at present over 7,500 volumes and over 5,400 pamphlets. This is not a circulating library, but is open free for consultation to all persons from 9 a.m. until 5 p.m. Over 500 periodical publications devoted to botany and closely related subjects are regularly received.

Docentry

To assist visitors in studying the collections a docent will leave the front door of the laboratory building every Monday, Wednesday, and Friday (weather permitting) at 3 p.m., as per the following schedules:

Spring Schedule

May	Monday	Japanese Garden Wild Flower Garden
	Wednesday	Rock Garden Conservatories
	Friday	Herbaceous and Shrub Garden Ecological Garden

June	Monday	Rock Garden Iris Garden
	Wednesday	Herbaceous and Shrub Garden Ecological Garden
	Friday	Japanese Garden Wild Flower Garden

Fall Schedule

September 15–30	Monday	Conservatory Garden Rock Garden Ecological Garden
	Wednesday	Japanese Garden Conservatory Garden
	Friday	Children's Garden Conservatory Garden
October	Monday	Conservatory Garden Conservatories
	Wednesday	Children's Garden Conservatories
	Friday	Japanese Garden Conservatories

This service is *free to members* of the Botanic Garden, and to their friends when accompanied by members; to others there is a nominal charge of 10 cents a person. No trips will be taken with parties of less than six adults.

NOTES

Bulb Planting.—During November, 1921, over 25,000 crocus bulbs were planted on the border mound directly south of the service gate on the east (Flatbush Avenue) side of the Garden;

11,400 narcissus bulbs were planted on the west-facing slope of the knoll in front of the laboratory building, between the walk and the tulips, planted last year; and about 2,000 bulbs of 18 species and varieties of *Lilium* were planted among the azaleas at the Flatbush Avenue entrance near Empire Boulevard. The lilies include the following species: *L. auratum* (white, bands of yellow, and purple spots), *canadense* (yellow or orange with black spots), *canadense rubrum* (red), *croceum* (orange), *elegans* (*Thunbergianum*), *Prince of Orange* (bright orange yellow), *Hansoni* (orange, purple spots), *Henryi* (apricot yellow, brown spots), *longiflorum* var. *Takesima* (white), *pardalinum* (red and orange with purplish spots), *tenuifolium* (scarlet), *tigrinum Fortunei* (dark orange), *tigrinum splendens* (red with dark spots), *regale* (white, shaded with purple), *speciosum album* (white), *speciosum rubrum* (white, shaded crimson), *speciosum Melpomene* (pink), *superbum* (orange and red), *sutchuenense* (orange, brown spotted).

Staff Meetings.—The first regular monthly meeting of the staff, registered students, and scientific and office assistants for 1921–22 was held Monday afternoon, November 14, in the Boys' and Girls' Club Room. Following tea, Dr. George M. Reed gave a talk, illustrated by specimens, on his investigations, now in progress, on disease resistance in cereals, with special reference to the sorghums. At the December meeting of the staff Mr. Louis Buhle spoke on the use of color photography in botanical illustration, showing, as lantern slides, a number of photographs of orchids in natural color, views of vegetation in the Catskill Mountains, and several slides taken in England during the past summer.

Fall Blooming of Azaleas.—Owing to the unusually late prolongation of warm weather two specimens of the "Omurasaki" Azaleas, near the Malbone Street entrance, came into bloom about November 3. The maximum outdoors temperatures recorded at the Garden for November were 74° on the 18th and 73° on the 19th. The minimum was 30° on the 10th.

Cedars of Lebanon Planted.—On November 21 two specimens of the Cedar of Lebanon (*Cedrus Libani*), about two feet high, were planted. These were raised from seed by Mr. G. H. Rintelman, of Flushing, L. I. The seeds were from the large tree, now

standing in Flushing as one of the few ancient relics of the once famous Prince nurseries.

Boys' and Girls' Club.—A meeting of the club was held on November 5, at 9 a.m. After the transaction of the club business, and a talk by Miss Shaw on the work for the coming winter, silver pins were presented for special work on the following topics: Gaillardia, wax begonia, ageratum, snapdragon, zinnia, azalea, snowberry, spindle tree, smoke tree, Japanese snowball. As the 1920 gift, Gus Magnusson presented a bunting flag 6 ft. x 10 ft. for the flagpole at the children's gardens, and as the 1921 gift, John Sweeney presented a silk flag 34 x 58 inches for indoor and other use. The annual contribution of $35 was also made for the support of the French war orphan.

Recent visitors to the Garden include Dr. Perley Spaulding, U. S. Department of Agriculture, Washington (November 25). Dr. Spaulding secured cuttings of several species of *Ribes* (currant) for experimental use in connection with studies of the blister-rust of pines. Prof. A. Warburg, Berlin, Germany, who is specially interested in the development of agriculture in Palestine (November 26).

Development of North Addition.—During November, 1921, work was begun and carried forward until December 7 on the finished grading, path making, and top soiling of the area known as the "north addition" of the Botanic Garden, between the Brooklyn Museum and Mt. Prospect reservoir. This area fronts on Eastern Parkway, and the entrance there is within about 50 feet of the Brooklyn Museum Station of the Interborough Subway (Broadway-7th Ave. line). This is one of the most used entrances to the Garden and will become of increasing importance when Eastern Parkway is restored and when the public becomes more familiar with this new subway line. The area is to be planted to shrubs and trees.

Herbarium Accessions.—June 23, 120 specimens of plants of Greece, collected on Mt. Athos. These plants were presented by Mr. Ballalas through the medium of New York University.

September 19, by purchase, 729 specimens of plants collected specially for the Botanic Garden in the Himalaya Mountains by Prof. L. A. Kenoyer, Allahabad Agricultural Institute, India.

November 23, 150 specimens from Texas. Presented by the Rev. L. H. Lighthipe.

November 25, 629 specimens from Long Island. Collected and presented to the Garden by William C. Ferguson.

November 30, by exchange with the Smithsonian Institution (U. S. National Museum), 1,412 miscellaneous specimens.

Cranberry School.—One of the most recent illustrations of the extent to which botanical science has become specialized is the initiation of a "cranberry school," under the auspices of the Cape Cod Cranberry Growers' Association and the Extension Service of the Massachusetts Agricultural College. The school is intended primarily for bog owners, bog foremen, high-school students, or any others interested in the cranberry industry. At the first field meeting of the school, at Wareham, Mass., November 5, the following subjects were considered: Black-head fireworm eggs, green spanworm eggs, cranberry girdler (work, cocoons, and eggs), root grubs, cranberry tipworm (work and wintering), wintering of fruit worm. The instruction is in charge of Dr. H. J. Franklin, superintendent of the Cranberry Experiment Station, East Wareham. Instruction during the coming year is free of charge.

Research Fellow.—Mr. James A. Faris has been appointed Research Fellow in connection with the investigations in plant diseases made possible by the gift of Mr. Alfred T. White and others. Mr. Faris received his degree of B.S.A. from the University of Missouri in 1916, and his M.A. degree from Nebraska in 1920. During 1917–18 he was professor of botany in the Junior College, St. Joseph, Mo., and from 1918–20, pathologist in the U. S. Department of Agriculture. From November, 1920, to November 15, 1921, when his appointment at the Botanic Garden took effect, he was pathologist at the Estacion Agronomica of the College of Agriculture, Santo Domingo. Mr. Faris has recently made an important contribution to our knowledge of a destructive potato disease, known as "Violet Root Rot."

The Brooklyn Institute of Arts and Sciences

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GENERAL INFORMATION

Membership.—All persons who are interested in the objects and maintenance of the Brooklyn Botanic Garden are eligible to membership. Members enjoy special privileges. Annual Membership, $10 yearly; Sustaining Membership. $25 yearly; Life Membership, $500. Full information concerning membership may be had by addressing *The Director, Brooklyn Botanic Garden, Brooklyn, N. Y.* Telephone, 6173 Prospect.

The Botanic Garden is open free to the public daily from 8 a.m. until dark. On Sundays and Holidays at 10 a.m.

Entrances.—On Flatbush Avenue, near Empire Boulevard (Malbone Street), and near Mt. Prospect reservoir; on Washington Avenue, south of Eastern Parkway and near Empire Boulevard; on Eastern Parkway, west of the Museum Building.

The street entrance to the Laboratory Building is at 978 Washington Avenue, opposite Montgomery Street.

A Docent will meet parties by appointment to conduct them through the garden. This service is free to members of the Botanic Garden, and to teachers with classes; to others there is a nominal charge of 25 cents an hour for parties of less than three, and 10 cents a person an hour for parties of three or more. For schedule of regular trips consult the *Prospectus*.

To Reach the Garden take Broadway (B.R.T.) Subway to Prospect Park station; Interborough Subway to Eastern Parkway-Brooklyn Museum Station; Flatbush Avenue trolley to Empire Boulevard; Franklin Avenue, Lorimer Street, and Tompkins Avenue trolleys to Washington Avenue; St. John's Place trolley to Sterling Place and Washington Avenue; Union Street and Vanderbilt Avenue trolleys to Prospect Park Plaza and Union Street.

PUBLICATIONS
OF THE
BROOKLYN BOTANIC GARDEN

RECORD. Established, January, 1912. An administrative periodical, issued quarterly. Contains, among other things, the *Annual Report* of the directors and heads of departments, special reports, announcements of courses of instruction, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Garden. To others one dollar a year; 25 cents a copy.

MEMOIRS. Established, July, 1918. Published irregularly. Volume I, *Dedication Papers:* comprising scientific papers presented at the dedication of the laboratory building and plant houses, April 19–21, 1917. Price $3.50, plus postage.

CONTRIBUTIONS. Papers originally published in botanical or other periodicals, reissued as "separates," without change of paging, and numbered consecutively. This series includes occasional papers, as well as those embodying the results of research done at the Garden, or by members of its staff or students. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume.

13. *The origin of new varieties of Nephrolepis by orthogenetic saltation. I. Progressive variations.* 28 pages, 6 plates. 1916.

14. *A white-cedar swamp at Merrick, Long Island, and its significance.* 10 pages, 5 plates. 1916.

15. *Present status of the problem of the effect of radium rays on plant life.* 8 pages. 1916.

16. *Flora of the vicinity of New York.* 6 pages, fig. 1. 1917.

17. *Endophyllum-like rusts of Porto Rico.* 9 pages, 3 plates. 1917.

18. *Inheritance of endosperm color in maize.* 11 pages. 1917.

19. *Studies of inheritance in Pisum. II. The present state of knowledge of heredity and variation in peas.* 102 pages. 1917.

20. *Inheritance studies in Pisum. III. The inheritance of height in peas.* 7 pages, fig. 1. 1918.

21. *A sketch of plant classification from Theophrastus to the present.* 16 pages. 1918.

22. *A basis for reconstructing botanical education.* 6 pages. 1919.

23. *Plant families: a plea for an international sequence.* 9 pages. 1920.

24. *Plants and animals of Mount Marcy, New York.* 69 pages, 1 plate, 22 figs. 1920.

25. *Endemism in the Bahama flora.* 10 pages, fig. 1, 1921.

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GUIDES to the collections, buildings, and grounds. Price based upon cost of publication.

SEED LIST. Issued in December of each year.

AMERICAN JOURNAL OF BOTANY. Established, January, 1914. Published, in cooperation with the BOTANICAL SOCIETY OF AMERICA, monthly, except during August and September. Subscription, $6.00 a year.

ECOLOGY. Established, January, 1920. Published quarterly in coöperation with the ECOLOGICAL SOCIETY OF AMERICA. Subscription, $3.00 a year.

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BROOKLYN BOTANIC GARDEN RECORD

VOL. XI APRIL, 1922 NO. 2

ELEVENTH ANNUAL REPORT

OF THE

BROOKLYN BOTANIC GARDEN

1921

FOR THE ADVANCEMENT OF BOTANY AND THE SERVICE OF THE CITY

PUBLISHED QUARTERLY
AT 41 NORTH QUEEN STREET
LANCASTER, PA.
BY THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES
Entered as second-class matter in the Post Office at Lancaster, Pa.,
under Act of August 24, 1912.

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OF THE
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26. *Plant composition and soil acidity of a Maine bog.* 4 pages. 1921.

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GENETICS. Established, January, 1916. Bi-monthly. Subscription, $6.00 a year.

THE NEED FOR ADDITIONAL ENDOWMENT

"The enthusiasm of a few may initiate an institution; but law, privilege, organization, and endowment can alone make it endure." The quotation is from Laurie's *The rise and early constitution of universities*. The Brooklyn Botanic Garden was initiated by the enthusiasm of a few, and it has had the advantage of favorable law, privilege, and organization. The few who initiated it have continued their enthusiasm and have given their constant and substantial support, but the rapid development of the Garden, and the broad lines along which this development is projected, and is being gradually carried out, have increased our needs for private funds greatly beyond our present income. An increase of $500,000 in endowment is urgently needed to meet present needs and establish present activities on a permanent basis. Ultimately this amount must be increased in order to make possible the realization of adopted plans.

FORMS OF BEQUEST TO THE BROOKLYN BOTANIC GARDEN

Form of Bequest for General Purposes

I hereby give, devise and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, the income from which said sum to be used for the educational and scientific work of the Brooklyn Botanic Garden.

Form of Bequest for a Curatorship

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of .....Dollars, as an endowment for a curatorship in the Brooklyn Botanic Garden, the income from which sum is to be used each year towards the payment of the salary of a curator in said Botanic Garden, to be known as the (here may be inserted the name of the donor or other person) curatorship.

Form of Bequest for a Fellowship

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, the income from which sum is to be used in the payment of a fellowship for advanced botanical investigation in the Brooklyn Botanic Garden, to be known as the.....fellowship.

Form of Bequest for other particular purposes designated by the testator

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, to be used (or the income from which to be used) for the Brooklyn Botanic Garden* .....

.....

*The following additional purposes are suggested for which endowment is needed.

1. The beautifying of the grounds.
2. The purchase of publications for the library.
4. Publishing the results of botanical investigations.
4. Popular botanical publication.
5. The endowment of a lectureship, or a lecture course.
6. Botanical illustration for publications and lectures.
7. The purchase or collection of plants.

INFORMATION CONCERNING MEMBERSHIP

The Brooklyn Institute of Arts and Sciences is organized in four main departments: 1. The Department of Education. 2. The Museums. 3. The Botanic Garden. 4. The Biological Laboratory.

Any of the following seven classes of membership may be taken out through the Botanic Garden:

1. Annual member	$ 10
2. Sustaining member	25
3. Life member	500
4. Permanent member	2,500
5. Donor	10,000
6. Patron	25,000
7. Benefactor	100,000

Sustaining members are annual members with full privileges in Departments one to three. Membership in classes two to seven carries full privileges in Departments one to three.

In addition to opportunities afforded to members of the Botanic Garden for public service through cooperating in its development, and helping to further its aims to advance and diffuse a knowledge and love of plants, to help preserve our native wild flowers, and to afford additional and much needed educational advantages in Brooklyn and Greater New York, members may also enjoy the privileges indicated on the following page.

Further information concerning membership may be had by addressing The Director, Brooklyn Botanic Garden, Brooklyn, N. Y., or by personal conference by appointment. Telephone, 6173 Prospect.

PRIVILEGES OF MEMBERSHIP

1. Free admission to the buildings and grounds at all times.
2. Cards of admission for self and friends to all exhibitions and openings preceding the admission of the general public, and to receptions.
3. Services of docent (by appointment), for self and party, when visiting the Garden.
4. Admission to all lectures under Garden auspices, at the Garden or elsewhere.
5. Special lectures and classes for the children of members.
6. Copies of Garden publications, as follows:
   - *a.* Record
   - *b.* Guides
   - *c.* Leaflets
   - *d.* Contributions
7. Privileges of the Library and Herbarium.
8. Expert advice on the choice and care of plants, indoors and out, on planting the home grounds, the care of lawns, and the treatment of plants affected by insects and fungous pests.
9. Identification of botanical specimens.
10. Admission to all field trips, and other scientific meetings under Garden auspices.

OBJECTS OF THE BROOKLYN BOTANIC GARDEN

"For the collection and culture of plants, flowers, shrubs and trees, the advancement of botanical science and knowledge, and the prosecution of original researches therein and in kindred subjects; for affording instruction in the same, and for the prosecution and exhibition of ornamental and decorative horticulture and gardening, and for the entertainment, recreation and instruction of the people." *From the Act of May 18, 1897, providing for the establishment of the Brooklyn Botanic Garden, Laws of New York, 1897, Chapter 509.*

THE BOTANIC GARDEN AND THE CITY

The BROOKLYN BOTANIC GARDEN, established in 1910, is a Department of the Brooklyn Institute of Arts and Sciences. It is supported in part by municipal appropriations, and in part by private funds, including income from endowment, membership dues, and special contributions. Its articulation with the City is through the Department of Parks.

The City owns the land devoted to Garden purposes, builds, lights, and heats the buildings, and keeps them in repair, and includes in its annual tax budget an appropriation for maintenance. One third of the cost of the present buildings was met from private funds.

Appointments to all positions are made by the director of the Garden, with the approval of the Botanic Garden Governing Committee, and all authorized expenditures for maintenance are made in the name of the private organization, from funds advanced by the Institute, which, in turn, is reimbursed from time to time by the City, within the limits, and according to the terms, of the annual appropriation.

By terms of a written *Agreement,* dated August 17, 1914,* between the City of New York and the Institute, touching the Botanic Garden, all plants must be purchased with private funds. In addition to this, it has been the practice of the Garden to purchase all books for the library, all specimens for the herbarium, all lantern slides, and numerous other items, and to pay certain salaries, with private funds.

The needs of the Garden for private funds for all these purposes are more than twice as great as the present income from endowment, membership dues, and special contributions. The director of the Garden will be glad to give full information as to possible uses of such funds to any who may be interested.

*This *Agreement,* published in full in the *Brooklyn Botanic Garden Record,* for April, 1915, amends the agreement of September 9, 1912, which amends the original agreement of September 28, 1909, published in the *Record* for January, 1912.

ELEVENTH ANNUAL REPORT

OF THE

BROOKLYN BOTANIC GARDEN

1921

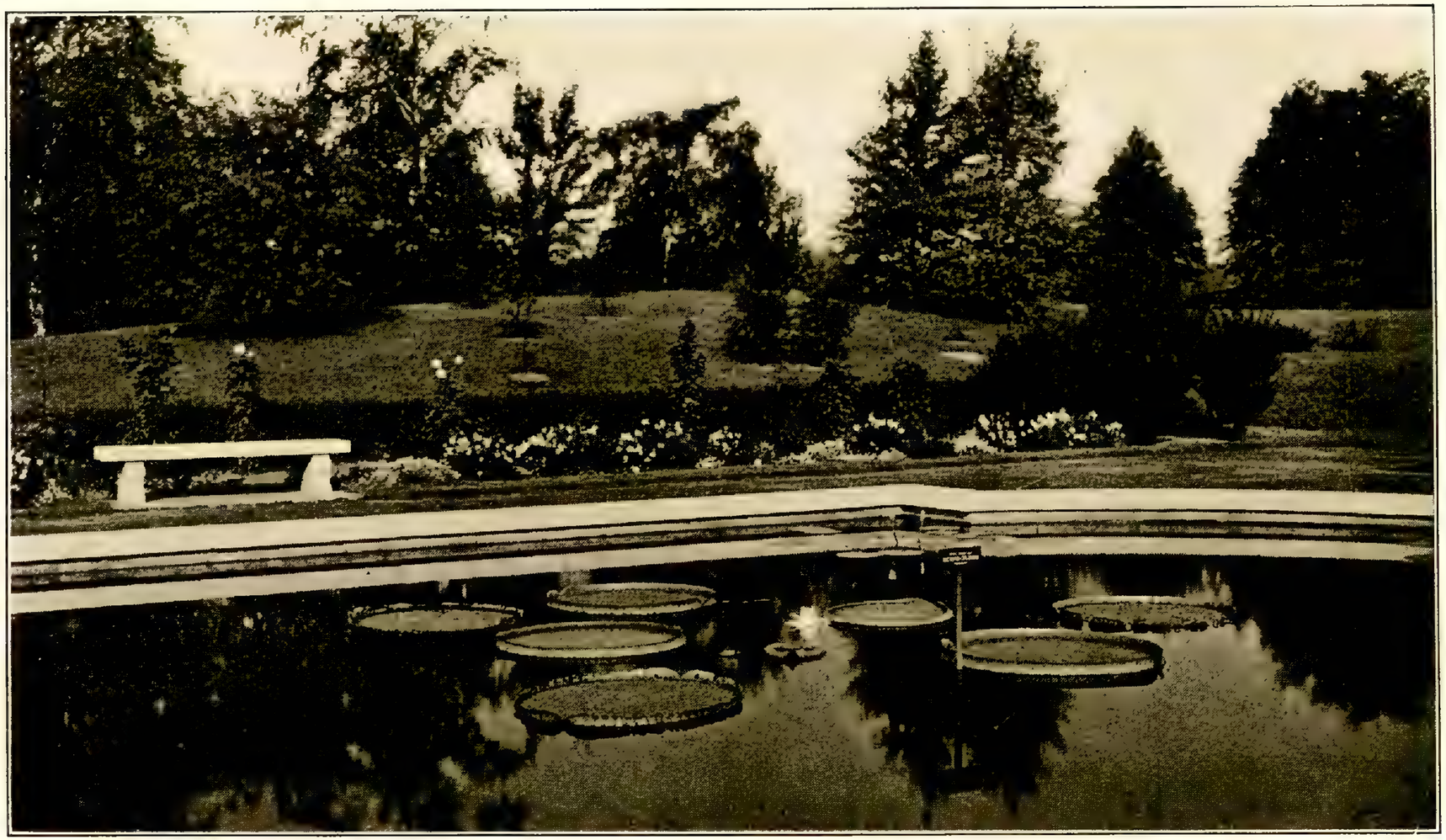

FIG. 1. *Victoria Cruziana* in bloom, September 10, 1921, in the tropical lily pool of the conservatory garden, a gift from Mr. Alfred T. White.

THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES

BROOKLYN BOTANIC GARDEN

RECORD

VOL. XI April, 1922 No. 2

ELEVENTH ANNUAL REPORT OF THE BROOKLYN BOTANIC GARDEN, 1921

REPORT OF THE DIRECTOR

TO THE GOVERNING COMMITTEE OF THE BOTANIC GARDEN:

I have the honor to present herewith the eleventh annual report of the Brooklyn Botanic Garden.

Losses and Gains

The year 1921 has been one of great losses and of substantial gains. On January 29 the man who, more than any other one person, made the Brooklyn Botanic Garden possible, Mr. Alfred T. White, met his death by drowning while skating on Forest Lake, near Central Valley, N. Y. The Botanic Garden RECORD for July, 1921, was a memorial number to Mr. White, and it will not be essential to repeat here the details there set forth. Only two days before his death Mr. White was in conference with other members of the Botanic Garden Governing Committee, the director, and the consulting landscape architect, concerning the development of the north addition, between the Brooklyn Museum and Mt. Prospect reservoir. He was not destined to see the plans then approved carried into execution, but the work was well along toward completion when winter weather compelled a temporary cessation to the operations.

It was Mr. White who secured, in 1909, the initial endowment of $50,000 required by the City of New York as a condition for entering into the cooperative agreement for the establishment and maintenance of the Garden on park lands of the city. In a similar manner he gave in part, and secured from others, in 1915, the fund of $100,000 which resulted in the appropriation of a like amount by the city for the completion of our laboratory and administration building. This was just prior to the entrance of the United States into the World War, and, as a consequence, at the beginning of a series of lean years for the city. It is almost certain that but for this munificent gift we should still be without our completed building, and the rapid expansion of our work since 1917, which the building made possible, would still be only an unrealized hope.

Mr. White's conception of the significance and value of the Botanic Garden to Brooklyn indicates, at one and the same time, his active interest in the city and in science and education. This conception is admirably expressed in a letter which he sent to the director to be read on the occasion of the visit to the Botanic Garden of the Brooklyn Chamber of Commerce on June 5, 1920.* The letter read, in part, as follows:

"I am very sorry that I shall not be present tomorrow afternoon to extend a greeting to my many friends of the Brooklyn Chamber of Commerce, who I hope will gather at the Botanic Garden.

"And I regret to lose this opportunity to say to a select body of fellow citizens something of the relation which the Botanic Garden stands in to the community. It has been our good fortune, within the last few years, to bring into public use and enjoyment forty acres of land owned by the city which had lain practically waste for fifty years, but a still greater good seems to me to be achieved in educating the taste of thousands of school children and adults in lines destined to make our city and borough more beautiful, and in developing the taste for the study of nature in many of its forms.

"The eagerness of the community, young and old, to make use

*Owing to an unusually severe storm the attendance at this meeting was so small that the formal exercises were dispensed with, and the letter above quoted was, therefore, not read. A more successful meeting of the Chamber of Commerce was held in 1921.

of the opportunity which has been thus opened has been greater than I dared to anticipate. As a new avenue of civic service, it seems to me that the Garden has obtained results which it will be difficult for our friends to grasp in a brief hour, but I trust that enough impression will be made on the members of the Chamber of Commerce to induce them and their fellow members to visit the different departments of the Garden work from time to time and feel that they have a share in the further development of the work, and in the satisfaction which a better acquaintance with it will surely bring to them."

The Japanese garden and the conservatory plaza and lily pools (the latter still incomplete) were Mr. White's gifts. But his value to the Botanic Garden was far beyond the measure of his material contributions. He was as interested in the development of the Garden as a scientific institution—in botanical research and the publication of the results thereof—as in all that tended to make the Garden of value to the local community, educationally, aesthetically, and socially. His sustained and intelligent active interest, increasing year by year, his counsel and advice, and his fruitful suggestions of lines of development were a constant bulwark and encouragement to the director. Our sense of loss at his going has only increased with the passing months. His place in the history of the Brooklyn Botanic Garden was unique, his loss irreplaceable.

Next to Mr. White, the man who was most actively interested in the establishment and early development of the Garden was A. Augustus Healy, for twenty-five years president of the Board of Trustees of the Brooklyn Institute of Arts and Sciences and, since the establishment of the Garden, a member of the Botanic Garden Governing Committee. Mr. Healy's primary interest was in art, but the major interest of his life, embracing all other interests, was the Brooklyn Institute, and all that concerned its welfare and usefulness; he was broad enough to appreciate and to encourage and take an active part in the development of the Institute along scientific as well as other lines. He gave generously of his time, his influence, and his funds. No greater loss could have come to the Botanic Garden than the passing of both Mr. White and Mr. Healy within a period of less than one year.

But, turning to the brighter side, it is a great pleasure briefly to note here the year's blessings and gains. Chief among these are new friends, a deepening and more active interest of old friends, larger opportunities for usefulness, increasing evidence of the need of a botanic garden in Brooklyn, and a substantial, though not large, increase in our resources.

At the March meeting of the Board of Trustees the president announced the appointment, as chairman of the Botanic Garden Governing Committee, of Mr. Frank Bailey, a member of the committee since June, 1920. For several years Mr. Bailey's main avocation has been horticulture, and for this, as well as for other reasons, the Garden is to be congratulated on this appointment.

In 1921, for the first time, the Board of Trustees adopted the definite policy of electing women to membership on the Board; as a result, the Botanic Garden Governing Committee has been strengthened by the appointment to membership on the committee of Miss Hilda Loines and Mrs. Lewis W. Francis. On April 28, 1921, Miss Loines was also elected chairman of the Woman's Auxiliary.

Public Response

The true indication of the extent to which an institution is meeting any real public need is the response of the community to the opportunities it affords and the increase of this response from year to year. The attendance figures for the Garden are given in detail in the appended report of the curator of public instruction (p. 56). The total general attendance, based upon the records of registering turnstiles at the entrance gates, was nearly 405,000, as against 312,500 last year. The total attendance of adults and children at classes and lectures was over 63,100, as against 54,700 in 1921, an increase of over 15 per cent.

The number of requests by telephone, mail, and in person for information and advice on matters pertaining to various phases of plant life—wild flowers, gardening, care of house plants and of trees and shrubs, of lawns and streets—has steadily increased, and has now reached a point where it would be difficult to meet any larger demands. Our popular *Leaflets* continue to increase in popularity and in circulation.

Investigations

Plant Pathology.—The White fund for research in plant pathology first became available on January 1, 1921 (see p. 44, *infra*), and the appointment of Dr. George M. Reed as curator of plant pathology, beginning January first, will be noted elsewhere in this report. Dr. Reed's investigations, now under way, have to do with the general question of disease resistance, and have been planned to include such problems as the following:

1. The determination of the presence or absence of resistance in particular hosts to certain parasites.
2. The influence of external conditions upon resistance and susceptibility of hosts to particular parasites.
3. The possible physiological specialization of parasites.
4. The essential nature of disease resistance.
5. The inheritance of the disease-resistant quality.

In the investigations it is planned to use whatever suitable material is available for such studies. During the past year the experiments carried out have had to do with certain cereal smuts. Investigations have been conducted with these forms for a number of years, and some phases of the work have been continued.

A large number of varieties of sorghums have been tested to determine their behavior toward the kernel smut, in continuation of previous work. Certain varieties, as the milos and feterita, have shown marked resistance to this disease. The kafirs, sorgos, and durras tested have proved to be quite susceptible. Among the kaoliangs, Dwarf Brown Kaoliang has again shown freedom from the smut.

A large number of varieties of oats has been included in the field tests with both the loose and covered smut of oats. In general, varieties that have formerly proved to be resistant have continued to manifest their resistance during the past season and susceptible varieties have again shown marked susceptibility. The varieties in general respond similarly toward the loose and covered smuts. In the greenhouse, where the conditions are particularly favorable for smut infections, certain resistant varieties have been subjected to severe tests. Most of these have remained free from the smut, indicating a high degree of resistance even when conditions for infection are as favorable as possible.

Smut experiments have also been conducted with the smut of Proso millet and the smut of Foxtail millet. A few varieties of each of these groups of millets have been tested. For the most part they have proved highly susceptible to their respective smut.

Mr. James A. Faris, whose appointment in November as Research Fellow is noted elsewhere in this report, is engaged upon the problem of determining the influence of temperature and soil moisture upon the infection of the host by certain smuts. So far he has been largely engaged in getting together the necessary equipment for a successful attack upon this problem.

FIG. 2. Mr. Alfred T. White (at the left), making his address after having laid the corner stone of the Laboratory Building, April 20, 1916. At the right of Mr. White is Mr. A. Augustus Healy, whose address followed that of Mr. White.

During the past year Miss Dorothy P. Tuthill has taken a course in general mycology and plant pathology, and has studied, from the laboratory standpoint, representatives of the main groups of fungi,

including the forms which are particularly important as causes of disease. She has started on a special problem dealing with the diseases of ornamental plants, studying in the laboratory the causal organisms of disease in these plants, and doing bibliographical work with special reference to the description of the organism, the pathological effects on the hosts, and recommended methods of control. Miss Tuthill is registered at New York University, and the work here is being done under the terms of the cooperative agreement between the University and the Brooklyn Botanic Garden, as stated on page 18 of the Botanic Garden RECORD for January, 1921.

On November 25, Dr. Perley Spaulding, pathologist, Laboratory of Forest Pathology, U. S. Department of Agriculture, called at the Garden and secured cuttings of five species of currant (*Ribes petraeum, luridum, robustum, irriguum,* and *alpestre commune*). The shrubs propagated from these cuttings will be used by Dr. Spaulding in his investigations on the destructive white pine blister-rust disease.

Ecology.—Mr. Taylor, curator of plants and plantations, has continued his studies of the environmental relations of plants on Long Island and elsewhere. This has included the taking of atmometer (evaporimeter) records during the year at various Long Island stations, extending from Brooklyn to Montauk, and at North Haven, Conn.

A study of Long Island soils has also been initiated in cooperation with the U. S. Department of Agriculture, for the purpose of ascertaining the rôle of the soil as a causal factor in the distribution of the vegetation of the Island.

Studies of soil acidity and plant succession have also been carried on in cooperation with Major Barrington Moore, as part of a comprehensive study of the phytogeography and ecology of Mt. Desert Island, Maine.

Genetics.—Dr. White's genetic studies with peas (*Pisum*) were continued at the Garden until June 1, when he sailed with the Mulford Expedition for the biological exploration of the Amazon basin, as the joint representative of the Botanic Garden and Harvard University. His cultures were cared for and records taken by his assistant, Miss Francena Meyer, until September 1. Among other matters, Dr. White, while in the Amazon basin, will give

special attention to new plant material likely to prove of interest or value for studies in plant breeding.

During 1921, Dr. Ralph C. Benedict, resident investigator, has continued his investigations in connection with variation in the fern genus *Nephrolepis,* particularly with respect to the cultivated form known as the Boston Fern. In this connection, he has completed, for publication, a second paper on "The Origin of New Varieties of *Nephrolepis* by Orthogenetic Saltation. II. Regressive Variation, etc.,". which will appear in the March issue of the *American Journal of Botany,* and as *Contribution* No. 27 of the Brooklyn Botanic Garden.

A second type of related work was represented in the preparation, during August and September, of an exhibit of *Nephrolepis* varieties which were entered, together with a considerable number of ferns of other genera from the general collection of the Botanic Garden, at the annual Fern Show of the Massachusetts Horticultural Society, held in Boston, September 22–25, 1921. Together with the ferns, a large wall chart, summarizing the variation of *Nephrolepis,* was sent for exhibition. An eight-page pamphlet was prepared which the Massachusetts Horticultural Society had printed for free distribution at the show, and a lecture, illustrated by over 50 lantern slides, mostly representing the Brooklyn Botanic Garden collections, was delivered at Horticultural Hall, Boston, September 24. The exhibit was installed at Boston by Mr. Free and Dr. Benedict on September 21.

Special plans for labeling the collection of living ferns, for obtaining the cooperation of horticultural publications, and for the exchange of herbarium material with the U. S. National Museum, and with Dr. Liberty Hyde Bailey, were also carried out.

During the spring and early summer experiments were begun by the director of the Garden to ascertain the possibility, or otherwise, of altering inheritance by exposing the germ-cells of plants to the rays from radium emanation. Significant positive results were obtained, pointing the way to further lines of investigation, but more definite announcement is reserved until the work has been carried beyond the preliminary stage. Grateful acknowledgment is here made to the authorities of the Memorial Hospital, New

York City, and especially to Dr. Halsey J. Bagg, for supplying the radium preparations for this work.

Cooperation with Schools

Attendance.—During the year 470 teachers brought nearly 25,000 pupils to the Garden for lectures and class instruction and to view the collections in conservatories and grounds. This was an increase of nearly 2,000 over 1920.

Distribution of Potted Plants.—Special attention is here called to the distribution of potted plants to schools, as noted in the report of the curator of elementary instruction (p. 62). Every school class that visits the Garden for instruction now receives a potted plant to take back to the schoolroom. During 1921 over 1,500 plants were thus distributed, and all of them were raised by the boys and girls in our children's greenhouse, as a by-product of their instruction in plant propagation.

Study material has been supplied to high schools when requested, and 358 Petri dishes have been filled with sterile culture media for use in connection with the study of germs.

Seed Packets.—There is a steadily increasing demand for packets of seeds for home planting by school children. In 1921, 130,890 packets were sold—an increase of 2,350 over 1920.

Public Instruction

Courses and Registration.—Thirty-seven courses of public instruction were offered during the year, in addition to our cooperative work with the schools, the school for gardeners, the children's garden, and the educational work carried on in connection with our plantations, conservatories, herbarium, and library. Of these courses, 10 were for children, 10 for teachers, 9 for the general public (adults), and 8 for advanced students, including research. The total number registered in all classes was 3,537.

Public Lectures.—Up to the present the giving of public lectures for adults has been a rather incidental feature of our educational work. Four lectures were given last April, free to the public, with a total attendance of 960. The attendance at lectures to children was 11,637. It is anticipated that this activity will be organized on a larger scale in 1922.

Syllabi of Lectures to Children.—The Brooklyn Botanic Garden believes that lecturing to large audiences of children yields smaller educational results than many other methods of instruction. This is specially true if the lecture is not followed up by class-room instruction in small groups. In order to facilitate and to help insure this follow-up work in the schools we have inaugurated the plan of giving to every pupil and teacher a printed syllabus of each public lecture. Syllabus No. 1, for example, is on the subject of *Rubber.* The children are first taken into the conservatory to see living specimens of the various plants that yield rubber, including the Brazilian rubber tree, *Hevea braziliensis;* then the illustrated lecture is given, at the close of which the syllabus is distributed. The main facts presented in the lecture are thus made available in accurate and permanent form for review and for reference and study in the schoolroom. In this way more lasting and more substantial results are obtained by the lecture. Syllabi are in process of preparation on all the lectures given at the Garden to children.

Loan Lectures.—The curator of public instruction has called attention, in his appended report, to the inauguration of a system of loaning lantern slides to schools. The slides are arranged in groups on different subjects, and each set, in a neat leather case, is accompanied by a full outline of the lecture for the use of the teacher.

School for Gardeners

During the year ten new students registered in the course for the training of gardeners. These men all came through the United States Veterans Bureau, formerly the Federal Board for Vocational Education. At the close of the year there were six men in attendance. Six were dropped for lack of qualifications to continue, all new men being registered on trial. Four of the men completed their two years of resident training, and all of them secured at once good places with attractive salaries. One of our graduates stood sixth on the list of civil-service candidates for a position as gardener in Prospect Park, having been in competition in the examination with men of 15–20 years of practical experience. One man was taken on here at the Botanic Garden and the others are on private places.

FIG. 3. View, April 28, 1921, in the Japanese Garden, a gift of Mr. Alfred T. White in 1915. Showing new faggot fence and new wooden lantern.

Special Exhibitions

Award of Gold Medal.—The Garden sent an educational exhibit of ferns to the "Grand Exhibition of Tropical Ferns and Orchids," held in Horticultural Hall, Boston, September 22–25, 1921, by the Massachusetts Horticultural Society. Our exhibit included 66 different varieties of the Boston fern (including several varieties which have originated at the Garden), and 42 different kinds of ferns not in the Boston fern group. These included 25 genera and 9 families, ranging from the small floating mosquito fern (*Azolla*) to large tropical land ferns. The total of 108 different forms gave the Garden third place in the number of kinds shown. Of this total 58 varieties were not shown by any other exhibitor. The Garden's exhibit was not entered in a competitive class, but was sent as an educational exhibit only. The officers of the Horticultural Society expressed their appreciation of the broad-minded policy of the Garden in sending so extensive an exhibit to another city and even to another state, and awarded the Garden a special Gold Medal for the extent and excellence of its exhibit.

Exhibit of Plant Immigrants and Natives.—An exhibit of plant immigrants and natives, including both economic plants and wild flowers and trees, was held in the Laboratory Building, October 15–28, in cooperation with "America's Making," a festival and exhibit held during the latter part of October throughout Greater New York, under the auspices of the New York State and City departments of education. The attendance the first Sunday (October 23) was, in four hours, over 1,500, and it was in consideration of this fact that the exhibit was continued through the following Sunday. The total attendance was over 5,600. At the close of the exhibit at the Garden it was sent, by request, to Bay Ridge High School (Brooklyn), where it was installed for several days by the department of biology of that school.

Library

The outstanding facts about the library are the unusual increase in the number of publications received and the steadily increasing number of readers. The number of readers has nearly doubled since 1918 and is nearly three times what it was in 1916, the last

year before our building was completed and the library went into its new quarters. Over 6,200 parts of publications were received during the year, 1,160 bound volumes, and 702 pamphlets—a total of 8,062 pieces. The number of current periodicals now being received is 529, and the total number of volumes and pamphlets, excluding duplicates, is 13,140.

Herbarium

The phanerogamic herbarium has increased by gift, exchange, and purchase by 9,088 specimens; 219 specimens have been sent in exchange. The gifts are acknowledged in Appendix I (p. 79). In my preceding report I noted the fact that the herbarium cases were then full to capacity, and that additional cases were needed properly to care for the new specimens that are continually coming in without active effort on our part. The accessions of 1921 have naturally made this need more acute.

The appended report on the Cryptogamic Herbarium records the accession of 330 specimens of fungi by gift, purchase, exchange, and collection, and 50 specimens of mosses by purchase. Special attention is called to the need of extending this collection, especially along the lines of research work in progress at the Garden.

Conservatories

The attendance at the conservatories continues to increase, the number for 1921 (over 19,000) being nearly 5,500 in excess of 1920. The necessity of taking House No. 7 for plant-breeding cultures has greatly increased the congestion and restricted the number of species in the collection. The need for the new range of larger conservatories, which is a part of the original plan of the Garden, has now become very urgent.

Plantations and Grounds

North Addition.—During the fall work was begun on the final grading of the north addition, lying between the Brooklyn Museum building and Mt. Prospect reservoir, and fronting on Eastern Parkway. This area, of about three acres, was added to the

Botanic Garden grounds in 1912, but funds have not hitherto been available to develop the tract and make it an integral part of the Garden, beyond serving as an avenue of approach to the planted area. At the north end of the tract is the Eastern Parkway entrance, only about 50 feet from the southeast exit of the new "Eastern Parkway-Brooklyn Museum" station of the Interborough Subway. At this gate is registered the second largest number of visitors of the five Garden entrances. With the restoration of Eastern Parkway (which was badly torn up during subway construction) this entrance will become increasingly important; the area will be seen by the increasing number of passers-by on the Parkway, and it is now highly important to develop it and to make it one of the most beautiful parts of the Garden. In order to provide the most effective setting for the large museum building to the east, the planting will be confined to trees and shrubs. In connection with grading the reservoir embankment, about 400 holes were dug and filled with top soil. The work was brought to a close by the first snowfall of the season on Saturday, December 3, one month later than the close of outdoor work in 1920.

Early Spring.—Vegetation began its spring awakening unusually early. Before March 10 buds of peony, magnolia, cherry, rose, lilac, and numerous other forms were bursting, and many herbaceous perennials had appeared above the ground. Crocus (always early) was in blossom, and a shrub of the Chinese witch-hazel (*Hamamelis mollis*) was a beautiful object in full bloom during the week of March 7. Out-of-doors work began on March 21, and the regular mowing of the lawns began on the unusually early date of April 1.

A New Garden Publication

Under date of December 31 an agreement was entered into with the editorial board of the bi-monthly journal *Genetics* by which the Brooklyn Botanic Garden becomes the publisher of that journal, beginning with the issue for January, 1922. This journal is a periodical record of investigations bearing on heredity and variation, and its publication by the Garden is a very logical step, since the greater part of the research work now in progress at the Garden is in genetics, or closely related subjects. The present edi-

torial board of *Genetics* is made up as follows: Prof. William E. Castle, Harvard University; Prof. Edwin G. Conklin, Princeton University; Prof. Charles B. Davenport, Carnegie Institute of Washington; Prof. Bradley M. Davis, University of Michigan; Prof. Edward M. East, Harvard University; Prof. Rollins A. Emerson, Cornell University; Prof. Herbert S. Jennings, The Johns Hopkins University; Prof. Thomas H. Morgan, Columbia University; Prof. Raymond Pearl, The Johns Hopkins University; and Prof. George H. Shull, Princeton University. The terms of the agreement are published as Appendix 6 of this report (pp. 89–91).

New Appointments

The appointment of Dr. George M. Reed, of the Office of Cereal Investigations, U. S. Department of Agriculture, as curator of plant pathology, on the White fund, was noted in my preceding *Annual Report,* and more fully in the Brooklyn Botanic Garden RECORD for January, 1921. Dr. Reed entered upon his duties on January 1.

The appointment of Dr. Arthur H. Graves as curator of public instruction, and of Miss Elsie Hammond as assistant curator of elementary instruction, was recorded with full data in the RECORD for October, 1921. Both appointments took effect on September 1.

The appointment of Mr. James A. Faris as Research Fellow in connection with the White fund for plant disease investigations will also be noted in detail in the RECORD for January, 1922, which will appear before this report is published. The appointment took effect November 15.

Annual Spring Inspection

The seventh annual spring inspection of the Garden by trustees, members, and invited guests was held on Tuesday, May 10. This was one of the most largely attended inspections in the history of the Garden, about 320 being present in the Auditorium at the exercises in recognition of the Tenth Anniversary of the establishment of the Garden and of the services of Mr. Alfred T. White in its foundation and development. Others came after the exercises in the auditorium were over. The weather was ideal and there were never before so many flowers in bloom at the time of the inspection.

FIG. 4. Rustic Torii erected in the Japanese Garden in May, 1921. The path leads to the Japanese Iris. The Japanese characters near the top signify, "Enter to the flowers."

Finances

Tax Budget Appropriation.—The tax budget appropriation for maintenance was, for personal service, $71,241, as against $85,540 requested; and for other than personal service, $18,809.80, as against $21,825.61 requested; or a total appropriation of $90,050.80, as against a total request of $107,365.61. The request was based on what the Botanic Garden Governing Committee felt was the least possible amount necessary to meet urgent needs. The difference between the amount requested and that appropriated ($17,314.81) was partially met by diverting about $15,420 of unrestricted private funds from the educational and scientific work for which they were originally intended. The unprovided remainder represents the extent to which the work of the Garden was still further curtailed and crippled. As soon as the Board of Estimate and Apportionment can see its way clear to meet the entire annual cost of maintenance, in harmony with the spirit of the agreement between the city and the Garden, this institution can at once begin to render a much larger service to this community, to education, and to science.

Tax Notes.—On June 13, 1919, the Board of Estimate and Apportionment was requested, through the Park Commissioner, to appropriate $10,000 in order to provide for an extension of the underground coal cellar of the Garden so as to carry it from the street fence line to the curbing on Washington Avenue and to connect it with the existing cellar. On July 18, 1919, the Board approved a resolution for the issue of Tax Notes in the sum of $5,000 to provide for the cost of the work, including $250 for the services of an inspector. When the bids were opened on March 4, 1920, the lowest bid was in the sum of $6,298. On May 7, 1920, the Board adopted the recommendation of its Committee on Finance and Budget for approval of increased cost from $4,750 to $6,298. The original bidder declined to execute the contract awarded on May 27, 1920, at the price bid on March 4. Eventually the plans and specifications were modified and simplified; the contract was readvertised and was let on June 9, 1921, to the low bidder, the Mott Haven Construction Co., 1050 Forest Avenue, Bronx. Work began on this contract on August 8 and was com-

pleted on October 21. The new work increases the capacity of our coal cellar by about 137 tons, to a total of about 430 tons for No. 1 buckwheat. This gives us a much larger factor of safety in the matter of being able to have enough coal on hand to tide over long periods of stormy weather in the winter, or other times when, for one reason or another, deliveries can not be made. A period of 26 months elapsed from the date when the first request for the appropriation was forwarded to the Board of Estimate and Apportionment to the date of beginning the work—over two years and four months to the completion of the work.

Private Funds.—The total private funds income for the year was $34,726.01, an increase of $679.15 over 1920. Of this amount $19,236.46 represents income from permanent endowment, the remainder being derived from several fluctuating and more or less uncertain sources, varying in amount from year to year. There have been expended $29,139.50 of private funds.

Endowment Increment Plan.—The most important financial step in the brief history of the Garden was the adoption by the Governing Committee, at its meeting of January 11, 1921, of a plan for Endowment Increment, substantially as recommended in the preceding annual report of the director. This plan provides for increasing the principal of Botanic Garden endowment by annual increments from income from certain endowment and other private funds, restricted by terms of gift, bequest, or otherwise to the educational and scientific work of the Garden. The plan was adopted for the year 1921, beginning as of February 1, and until action is taken to the contrary. It was voted to create a new account to be known as "Endowment Increment Account," and to make transfers to this account to the amount of 20 per cent. of the annual income from the various funds included in the plan. During the year $4,876.22 were thus added to the permanent funds of the Garden. The amount thus to be transferred and invested will increase each year, and the plan can be carried out without seriously curtailing our educational and scientific work. In fact, within a very few years the available income for these purposes will be much greater than could be possible without such a plan, and it is a great pleasure to look forward fifty or a hundred years

(a very short period in the history of an institution) and try to realize all that such a plan will mean in the increase of the Garden's resources, and therefore in the expansion and enrichment of its work, under the direction of our successors.

Needs of the Garden

Plant Houses and Grounds.—The Brooklyn Botanic Garden has now reached a somewhat critical period in its development. The growth of our collection of hardy plants, which is rapidly approaching the limits of the capacity of our grounds, makes it more and more urgent for us to find, *outside of our present area,* a plot of suitable location and size for a nursery. We are at present unable to propagate duplicate specimens of rare plants (especially of shrubs and trees) for purpose of exchange or to replace specimens lost by disease, severe winter weather, storms, vandalism, or other causes. There are already numerous gaps in our scientific collections caused by such losses, and which we have not yet been able to fill.

I have referred above (p. 37) to our need of new conservatories. The present range is so overcrowded as to make it quite impossible to give all the plants the cultural conditions essential to their health and vigor. Species requiring widely different conditions of temperature and humidity are now, of necessity, side by side in the same house. Many plants are already so large that they must be given away or thrown out unless more ample accommodations soon become available. This is particularly the case with our collection of rare cycads, obtained at great effort and considerable expense from Australia in 1915. There is only one other similar collection in America. These plants continue to increase in size each year, and it is difficult to see how they can much longer be retained in our collections unless they can be given larger quarters. It would be a pity if they had to be abandoned now, after all the trouble and expense to secure them, and the care bestowed on them during the past six years. Numerous other similar cases could be cited.

Moreover, the congestion is making it difficult for the increasing number of visitors to pass through the plant houses with comfort and pleasure to themselves and without danger of injuring the

plants. It is also difficult to label the plants so that the labels are not concealed. The educational value of the collections is thus curtailed.

With the conservatories, as with the plantations, the need of propagating houses is exceedingly urgent, not only for propagation, but for the care of plants that have become sickly, or that need special attention and nursing, or temporary withdrawal from the public conservatories for other reasons.

Greenhouse accommodations for experimental cultures in connection with the plant breeding, plant disease, and other investigations now in progress are wholly inadequate.

The need of a nursery and experimental plot would best be met by securing a tract of land of several acres within easy access of the Garden. An inexpensive propagating house could be erected on this plot, and this could serve for experimental cultures as well as for routine propagation and other needs in connection with the maintenance of our hardy and tender collections.

The congestion in the public conservatories can, of course, be met only by erecting a new range. Such a range was included in the original plans for the development of the Garden. The site set aside for it is now serving as the experimental garden, and the erection of the new conservatories would, therefore, make it imperative to provide an experimental plot elsewhere.

Endowment for Research.—The special research fund of $50,000 secured and, in part, contributed by Mr. Alfred T. White will provide for work now in progress for only three or four years. To establish this work in perpetuity, to make possible its normal and logical expansion, including salaries, equipment, traveling expenses, publication of results, *et cetera,* permanent funds are needed sufficient to insure an income of not less than $25,000 a year. Ultimately this amount would need to be increased.

To secure the additional land and plant houses recommended above, to provide for additional annual maintenance, and to establish the scientific work on a permanent basis, the Botanic Garden endowment fund should be increased as soon as possible by not less than $500,000. In time this amount should be increased to not less than one million dollars.

The need of a new fence to inclose the grounds, stone steps and

FIG. 5. View from the front door of the children's house. Juvenile gardeners entering under the rose arch to spend a Saturday morning in the children's garden.

bridges to replace the present temporary wooden structures, erected five or six years ago, and now both unsightly and unsafe, an underground room at the south end of the conservatories for the storage of garden implements, and new entrance gates, to all of which attention has been called in previous reports, will continue to be annual needs until they are supplied.

Acknowledgments

It is a pleasure to make grateful acknowledgment here of the numerous gifts, large and small, recorded in Appendix I (pp. 78–81), and especially to express appreciation of the interest and confidence in our work of which these gifts are substantial evidence.

Accompanying Papers

The annual reports of heads of departments, financial statements, and Appendixes 1–6, including acknowledgment of gifts, publications and addresses of members of staff, a list of meetings held at the Garden by outside organizations, and the *Agreement* with the editorial board of *Genetics* concerning the publication of that journal by the Garden, are appended as integral parts of this report.

Respectfully submitted,

C. Stuart Gager,
Director.

REPORT OF THE CURATOR OF PLANTS AND PLANTATIONS FOR 1921

Dr. C. Stuart Gager, Director.

Sir: I take pleasure in submitting herewith my report for the year ending December 31, 1921.

General Maintenance and Construction Force

Work began March 21 and ended December 3, the longest working season for many years. During the busiest season of spring we employed an average of 19 laborers, while for the balance of

the season the force was cut to 11 men. Our general condition of upkeep is still so far short of that on most of the private estates on Long Island that a larger permanent force of men for this purpose is urged for 1922.

New work accomplished during the year was as follows:

1. Grading and preparing for planting the border mound north of present group of azaleas, along Flatbush Avenue to service gate.
2. Enlarging the experimental plot and putting up new fence around it.
3. Extending and raising terraces at southern end of Esplanade.
4. Putting up guard fencing at the entranceway planting at Malbone Street gate.
5. Grading, topsoiling, and preparing for shrub planting part of the area between the Museum and Reservoir.

The last was the most important, as it comprises the largest of our unimproved tracts and now seems to be within measurable distance of permanent improvement. As in the past, the force of day laborers has been under the daily and faithful supervision of Mr. Herman Kolsh, foreman of laborers.

Gardening Force

New work accomplished during the year was as follows:

1. Planting of Lombardy poplars continued along Malbone Street.
2. Border planting of 57 rose bushes along the Brighton Beach Cut and along the south end of the Children's Garden.
3. Planting around drinking fountain, Children's Garden.
4. Azalea planting extended on Azalea Hill.
5. Twenty-five thousand crocuses, 11,400 narcissus planted.
6. Over 1,500 lilies planted among Azaleas on the border mound, a background of evergreen and deciduous shrubs added to part of this plantation.
7. Rock garden extended east of the walk.
8. Thirty *Prunus serrulata,* J. H. Veitch, planted on both sides of the walk west of the Japanese Garden hill.
9. Hedge of *Syringa Emodi* planted along east border of Oleaceae.

There was, in addition, a considerable amount of replacement planting and filling in of shrubbery, together with additions to existing collections. These are noted in the list of plant accessions printed elsewhere.

Labeling and Record Work

The number of labels made was as follows:

Steel plant labels	348
Steel family labels	30
Large lead labels	4
Lead labels for woody plants	106
Greenhouse lead labels	97
Small wood labels	127
Miscellaneous labels for plants	70
Total	782

Besides many signs, notices, etc.

The consignment numbers 21–1 to 21–34 were assigned during the year to 245 different plants, which were added to the synoptic collections. The annual *Seed List* was prepared, printed, and distributed to foreign botanic gardens. Cultivated plants were collected and mounted, and all new plantings were recorded and many service labels made, especially in the rock garden and in the propagating houses. A revised list of all the genera in the Garden has been prepared, containing many additions to the one for the preceding year. For two weeks during the summer Mrs. Burdick assisted the genetics department with their records.

A new style of label was adopted for the woody plants. It is of lead, attached by screws to a three-foot steel standard, which is sunk into the ground about a foot and a half to prevent its being disturbed. The standard is given a coat of tar to protect the part that is in the ground from rust. About one hundred of these labels have already been placed.

Specimens of each of the varieties of the Boston Fern (*Nephrolepis*) grown at the Garden were collected, dried, and mounted under the direction of Dr. R. C. Benedict. Two duplicate herbarium sets of *Nephrolepis* varieties were compiled and sent out as exchanges with other institutions.

An exhibition illustrating the evolution of plants was shown at

the American Museum of Natural History during the week set aside for the biology departments of the high schools of greater New York.

Mounted specimens of plants were also hung up in the exhibit room of the Garden during the exhibition of "Plant Natives and Immigrants," which was held in October.

Three card catalogs of labels were completed. They include the names of woody, conservatory, and herbaceous plants in so far as labels have actually been made. This will facilitate labeling the remainder of the collections.

Phanerogamic Herbarium

The total number of herbarium specimens acquired during the year was 9,088, of which 1,129 were given to the Garden, 2,130 received in exchange, and 5,829 were purchased. Only 894 specimens were actually mounted, so that we are acquiring collections faster than they can be cared for. New herbarium cases and the services of a mounter are urgently needed to make available the stored material now on hand.

Much more important is the necessity for the appointment of a keeper of the herbarium whose interest and training is wholly in systematic botany. Our herbarium will not be of first-rate usefulness until it has been thoroughly gone over for a period of years by such a man. At present we do little more than look after its mechanical condition, fumigate it, etc.; but it is high time that more attention was given to the taxonomic revision of the material.

Among the gifts which are listed elsewhere a particularly useful one just now is that of William C. Ferguson, Esq., of over six hundred plants from Long Island. His collections, which are very carefully identified, are a distinct contribution to the "Flora of Long Island," which is in preparation.

Miscellaneous Statistics

Phanerogamic Herbarium

Distribution by Exchange

To Dr. L. H. Bailey, Ithaca, New York, 105 pressed specimens of *Nephrolepis* varieties, cultivated at the Brooklyn Botanic Garden by Dr. R. C. Benedict.

To Mr. W. R. Maxon, U. S. National Herbarium, Washington, D. C., 114 pressed specimens of *Nephrolepis* varieties, cultivated at the Brooklyn Botanic Garden by Dr. R. C. Benedict.

Specimens Received by Exchange

Mr. Camillio Schneider, Vienna, Austria, 710 specimens collected in the Carpathian Mountains, Austria.

U. S. National Museum, Washington, D. C., 1,412 miscellaneous duplicates.

Number of herbarium specimens mounted in 1921: 894.

Specimens Purchased

The herbarium of A. Fredholm, containing 1,100 species of Porto Rican plants, and about 4,000 duplicates of the same, making a total of 5,100.

Mr. L. A. Kenoyer, Allahabad Agricultural Institute, Allahabad, India, 729 specimens collected in the Himalayas.

Living Plants Obtained by Collection

From Dr. Orland E. White, with the Mulford Scientific Expedition, South America (16).

Miss Margaret Chapin (1).

Dr. Alfred Gundersen, native plants collected on Long Island (10).

Living Plants Obtained by Exchange

Mr. Clarence Lown, Poughkeepsie, N. Y. (36 alpine plants).

Missouri Botanical Garden (2 varieties of water lilies).

Seeds Distributed to Other Institutions

On an exchange basis, 1,918 packets of seeds were distributed to other institutions during the spring of 1921.

The number of species and varieties of plants raised from seed during the year 1921 totaled 611.

Personal Activities

The "Vegetation of Long Island" is now in such state that I hope to be able to have it ready for the printer during 1922. A

somewhat extensive series of atmometer records were made from different parts of the Island, stations being established at the Garden, Baldwin, Cherry Grove, Coram, Crystal Brook, Montauk, and at North Haven, Conn. The latter instruments were read by Mr. Frederick A. Musch, whose faithfulness and precision can not be too highly praised. It is a pleasure to record such purely voluntary, disinterested, and efficient assistance. Other voluntary observers on Long Island will be noted with the publication of the records.

In cooperation with the Bureau of Soils, U. S. Department of Agriculture, I have begun the collection of soil samples of Long Island, for which various tests are made here; the balance will be completed in Washington. Certain features of the Island are unquestionably a response to soil factors rather than to climate. Some of these factors are now being studied extensively.

Work was also continued with Major Barrington Moore on the vegetation of Mt. Desert Island in Maine. During the year we brought out a joint paper in *Ecology* (Brooklyn Botanic Garden *Contributions,* No. 26) on certain features of plant succession and soil acidity on that island. This work will continue for some time, a comprehensive account of the ecology and phytogeography of the island being the objective.

Contributions Number 25, "*Endemism in the Bahama Flora,*" reprinted from the *Annals of Botany,* and Number 26, mentioned above, were published during the year.

Since December first I have had the very efficient and enthusiastic assistance of Miss Helen Smith as Scientific Assistant. Much of the detail of securing the moisture-holding capacity and wilting coefficient of different Long Island and Maine soils has been assumed by her.

I continue to serve as Associate Editor of *Ecology* and for the Torrey Botanical Club, although after ten years as editor of *Torreya* I felt obliged to stop with the volume beginning in 1921, as I feel the need of more time for purely scientific work.

Respectfully submitted,

NORMAN TAYLOR,

Curator of Plants and Plantations.

REPORT ON THE CRYPTOGAMIC HERBARIUM

DR. C. STUART GAGER, DIRECTOR.

Sir: I have the honor to submit the following report on the Cryptogamic Herbarium for the year 1921:

No extensive collections have been added to the Cryptogamic Herbarium during the past year. The following statement gives the number of specimens added, together with other information.

ACCESSIONS TO THE CRYPTOGAMIC HERBARIUM, 1921

Date	No. of Specimens	From	How Acquired	Remarks
Jan.....	10	W. W. Diehl	Exchange	Fungi—Flora Danica
Apr. 12..	25	J. M. Holzinger	Purchase	Mosses—Fasc. 17. Nos. 400–425
15..	15	G. L. Zundel	Gift	Smuts
15..	200	E. Bartholomew	Purchase	Rusts. N. A. Ured. Cent. 24, 25
19..	25	J. M. Holzinger	Purchase	Mosses—Fasc. 16. Nos. 375–400
	1	E. V. Woodward	Gift	Polyporus
Dec. 16..	80	Percy Wilson	Purchase	Fungi—Local collections
Dec.....	9	J. A. Faris	Gift	Fungi—Santo Domingo
Dec.....	15			Fungi—Local collections

The Cryptogamic Herbarium, to be of special value for the examination of authentic material, is greatly in need of additions. There are very few exsiccati collections present in the Herbarium and most of these are American. Since much of the work on fungi has been done in Europe, it is highly desirable that important European exsiccati be added to the collections.

It is possible at the present time to obtain collections of European mycologists which include valuable exsiccati. The opportunity is probably better now than it will be any time in the future.

Respectfully submitted,

GEORGE M. REED,
Curator of Plant Pathology.

REPORT OF THE CURATOR OF PUBLIC INSTRUCTION FOR 1921

DR. C. STUART GAGER, DIRECTOR.

Sir: I beg to submit herewith my report for the year ending December 31, 1921.

My appointment as Curator of Public Instruction took effect September 1,1921, so that my own personal activities cover a period of only four months; but, in addition, I have incorporated in what follows the principal features of the work of this curatorship, carried on previous to my incumbency by the Curator of Elementary Instruction.

Public Lectures

This year public lectures were given at the Garden as follows:

1. March 19.—The Missouri Botanical Garden. Mr. G. H. Pring, Horticulturist, Missouri Botanical Garden.

2. April 8.—The Flower Garden: Its Plan and Arrangement. Miss Grace Tabor, Author, Editor, and Landscape Architect, New York City.

3. April 15.—The Meaning of a Flower. Samuel C. Schmucker, Professor of Biological Sciences, State Normal School, West Chester, Pa.

4. April 22.—Flower Arrangement. Mr. B. F. Letson, Boston, Mass.

5. April 29.—Common Garden Flowers: How They May Be Improved. Dr. Orland E. White, Curator of Plant Breeding, Brooklyn Botanic Garden.

The attendance at these lectures was larger than the year before. It is my feeling that this branch of the Garden's activities should be encouraged, especially since instruction of the people along botanical lines was one of the avowed intents and purposes of the founders of this institution. I therefore recommend the creation of a suitable fund to be devoted solely to this work.

Loan Lectures

We have prepared four sets of lantern slides to be lent to the public schools on request, on the following subjects:

FIG. 6. Teachers class studying shrubs in the Botanic Garden.

1. Plant Life
2. Spring Wild Flowers
3. Common Trees
4. Rice Culture

A syllabus of a short talk on the subject accompanies each set of slides.

Class Material for Schools

During the year 358 petri dishes, eighteen test tubes, and four flasks were filled with sterilized agar for use in the study of bacteria and fungi in the schools; there were six requests for *Spirogyra* and *Elodea,* and also other material, such as fern prothallia and sori, twigs of various species of trees, etc. In this way one college, eleven high schools, and one public school were assisted. The list is larger than ever before and indicates an increasing demand for this form of cooperation.

Scout Work, Etc.

The nature work of Mr. Stoll with Boy Scouts, Y. M. C. A., and similar groups, both in classes of instruction and examination, has been carried on as usual, reaching approximately 3,000 individuals. The Boy Scout organization of the city has recognized his services by conferring upon him the title of Deputy City Commissioner. On account of his increasing duties at the Garden, Mr. Stoll has now found it necessary to resign his position as expert examiner in Boy Scout subjects. About 360 Girl Scouts were brought to the Garden during the year for instruction in nature subjects.

Classes and Attendance

The course for the training of gardeners, in cooperation with the United States Veterans Bureau, has maintained its efficiency of the previous year and continues to meet with the approval and indorsement of the Federal authorities. Prior to the date of my appointment Dr. Gundersen assisted in the instruction of these and other classes.

The total attendance at all our classes and lectures was 63,104, an increase of over 15 per cent. above that of last year. The fol-

lowing table shows the attendance and registration at the Brooklyn Botanic Garden during 1921:

TABLE I

ATTENDANCE AT THE GARDEN DURING 1921

	Jan.	Feb.	Mar.	Apr.	May	June	July
At regular classes	723	1,200	2,046	2,793	2,561	1,400	2,596
At visiting classes	758	800	460	4,854	8,130	2,219	356
At lectures to children	386	600	260	1,518	3,815	648	300
At lectures to adults	0	256	300	960	951	125	56
At conservatories	1,380	1,127	1,777	2,274	2,398	1,539	1,212
Total registration at gates	21,094	15,736	37,707	38,133	52,540	46,121	42,434

	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Totals
At regular classes	2,600	2,280	2,245	1,374	2,190	24,008
At visiting classes	0	1,813	3,879	847	695	24,811
At lectures to children	0	882	2,838	380	10	11,637
At lectures to adults	0	0	0	0	0	2,648
At conservatories	1,478	1,528	2,005	1,211	1,117	19,046
Total registration at gates	48,104	33,590	35,217	20,615	13,598	404,889

Exhibition of Immigrant and Native Plants

In connection with the festival and pageants of "America's Making" in the New York schools, an exhibition of New York's immigrant and native plants was held at the Garden, lasting for 14 days, from Monday, October 17, to Sunday, October 30, inclusive. The total attendance was over 5,600, and on one of the Sundays nearly 1,500. At the conclusion of the exhibition the living material was given to a teacher of one of our high schools at her request and used for a display there.

Newspaper and Editorial Work

It has been felt that the Garden may improve its public service by issuing to the newspapers at regular intervals items of general interest relating to the Garden, such as public lectures, exhibitions, classes for instruction, the prosecution and results of research, noteworthy features about particular plants in the Garden, additions to the collections, improvements in the Garden, etc. This

work has been carried on under my direction since the beginning of my incumbency.

During the past year ten *Leaflets* have been issued on various botanical subjects with which the Garden has been connected. Besides editing the *Leaflets,* I have taken Dr. White's place, during his absence, on the Editorial Committee of the *American Journal of Botany.*

Staff Meetings

Regular monthly meetings of the staff and registered students of the Garden were resumed in November. These meetings are for the discussion of the scientific and educational work carried on at the Garden or elsewhere.

FIG. 7. After a hard morning's work in the children's garden. Getting a drink from the bubbler drinking fountain at the children's building, presented by a member of the Woman's Auxiliary, April 1921.

Independent Investigation

In cooperation with the Office of Investigations in Forest Pathology, Bureau of Plant Industry, U. S. Dept. of Agriculture, I have continued the work begun in 1918 on varieties of the American chestnut which show partial resistance to the well-known destructive bark blight. This region is particularly favorable for the work, for it was in this neighborhood, in 1918, that I first located resistant strains of the chestnut.

Work begun several years ago on a little-known destructive blight of the butternut, the causal organism of which I have determined to be *Melanconis carthusiana,* has also occupied a portion of my time. Through the generosity of Mr. Willard G. Bixby, the well-known nut culturist of Baldwin, Long Island, about fifty young trees of Black Walnut, English Walnut, Japanese Walnut, and native Butternut have been obtained for experimental purposes, particularly with the object of ascertaining whether these other species are also susceptible to this disease.

Respectfully submitted,

ARTHUR HARMOUNT GRAVES,
Curator of Public Instruction.

REPORT OF THE CURATOR OF ELEMENTARY INSTRUCTION FOR 1921

DR. C. STUART GAGER, DIRECTOR.

Sir: I herewith submit the following report from the Department of Elementary Instruction for the year ending December 31, 1921:

The outstanding work of this department for the past year has been one of reorganization of special pieces of work for highest efficiency. For example, in the case of the children's outdoor garden, we have endeavored to show what we believe is the greatest possible amount of crop to raise on about three quarters of an acre of city land when the allotted garden space per individual is constantly worked. During the eight years we have had a garden it has been impossible to show any such crop value as the one for this current year, a report of which follows. The tables give total

amounts, cost of vegetables at average market prices, and total values.

TABLE II

CHILDREN'S GARDEN CROP REPORT, 1921

From June 4 to August 8

Area of Garden about Three Quarters of an Acre

Crop	Amount	Market Price	Value
Beans	865 qts.	18 c. a qt.	$ 155.70
Beets	6,122	4 for 5 c.	76.50
Beet tops	298 qts.	18 c. a qt.	53.64
Carrots	361	5 for 5 c.	3.60
Chard	3,104 qts.	15 c. a qt.	465.60
Corn	338 ears	5 c. apiece	16.90
Cucumbers	5	6 c. apiece	.30
Lettuce	2,055 heads	13 c. a head	267.15
Onions	1,593	24 for 10 c.	6.60
Parsley	114 bunches	5 c. a bunch	5.70
Pepper	1		.08
Radishes	34,216	10 for 5 c.	171.08
Spinach	778 qts.	20 c. a qt.	155.60
Tomatoes	562	4 for 15 c.	21.00
Turnips	63	3 for 10 c.	2.10
Total value	.....	.....	$1,401.55

This table shows the crop taken out of the garden from the first and second plantings.

TABLE III

CHILDREN'S GARDEN CROP REPORT, 1921

From August 8 to September 1

Area of Garden about Three Quarters of an Acre

Crop	Amount	Cost	Value
Beans	3 qts.	15 c. a qt.	$ .45
Beets	2,920	2 c. apiece	58.40
Beet tops	80 qts.	18 c. a qt.	14.40
Carrots	1,133	1 c. apiece	11.33
Celery	11 bunches	5 c. a bunch	.55
Chard	1,982 qts.	12 c. a qt.	237.84
Corn	541 ears	6 for 25 c.	22.50
Cucumbers	15	4 c. apiece	.60
Eggplant	5	20 c. apiece	1.00
Lettuce	742 heads	10 c. a head	74.20
Onions	2,726	24 for 10 c.	11.30
Parsley	276 bunches	5 c. a bunch	13.80
Pepper	150	6 for 10 c.	2.50
Spinach	1,134 qts.	20 c. a qt.	226.80
Tomatoes	1,724	4 for 12 c.	51.72
Total value	.....	.....	$727.39

Note that from August 8 to September 1 the value of the crop drops. This is the period of replanting for second and third crops.

TABLE IV

CHILDREN'S GARDEN CROP REPORT, 1921

From September 1 to October 22

Area of Garden about Three Quarters of an Acre

Crop	Amount	Cost	Value
Beans	166 qts.	15 c. a qt.	$ 24.90
Beets	4,434	2 c. each	88.60
Carrots	4,462	1 c. each	44.62
Celery	206 plants	15 c. each	30.90
Chard	2,435 qts.	12 c. a qt.	292.20
Corn	51 ears	5 c. each	2.55
Eggplant	239	20 c. each	47.80
Lettuce	837 heads	12 c. a head	104.76
Onion	65	24 for 10 c.	.27
Parsley	1,596 bunches	5 c. a bunch	79.80
Peppers	1,003	6 for 10 c.	16.70
Radishes	6,101	12 for 5 c.	25.42
Spinach	1,632 qts.	14 c. a qt.	228.48
Tomatoes	1,841	4 for 15 c.	69.00
Turnips	1,201	3 c. each	36.03
Total value			$1,092.03
Value of crop through August 8			1,401.55
Value of crop through September 1			727.39
Total value of crop for 1921			$3,220.97

Table III shows a marked increase over Table II. This high value in late crop is due to careful planning and replanting of seed as soon as one crop comes out of the garden.

The interest in these tables centers not upon the value as represented in figures, but upon the educational values which are implied in what might be considered the maximum of efficiency in gardening. One value is that of time, or it might be called accumulative. Each season's results have been built up from the results of previous seasons, bringing us to the present state of crop efficiency. It would have been possible, perhaps, two years ago to have brought about this result through forcing the issue, but our educational values would have suffered. In the past year the method of con-

FIG. 8. "Study nature, not books" (*Agassiz*). A lesson in the children's garden on insects injurious to crops. June 25, 1921.

stant cropping was used because the boys and girls involved in this project had sufficient foundation from their past experience in gardening to work intelligently and independently toward the end set before them, and that end was the production of as much crop as possible on a given area of land. As far as I know, there are few gardens in this country where, under given conditions, so great a use has been made of a given area of city land.

Another onward step in our work has been that of grading more carefully our garden work, so that the beginner covered a certain definite ground of knowledge in gardening upon which more advanced lessons were based for the next grading. Some of the lessons taught to beginners covered the following subjects: time and method of planting, thinning, cultivating and planting, neatness in work, care of tools. In the next grading independent plans for a garden and choices of crops are worked out. In the third educational stage the theme swings around the point of increased knowledge of plants and plant families.

We have been experimenting with certain educational tests of our own this year—tests to determine clearness of concept in the mind of the child who comes to us untrained in garden work, and of those boys and girls who have been studying with us. The department is not prepared at this time to present any of these tests, nor does it deem it wise to, since there is not enough data to demonstrate any one point involved.

Our work with penny packets of seed for children has increased normally during the past year. Miss Edna Burtis, who has charge of that work, has reorganized it and placed it on a more efficient and business-like basis. A method of rechecking the work has been used at her suggestion which minimizes the number of possible petty errors, and this has been a very real contribution.

Our greenhouse work has grown to such an extent that the mechanical end of it, the handling of pots and of class material, has become so burdensome that it seemed wise to engage a man for this purpose. Mr. John Stimpfl, one of our Federal Board students, accepted this greenhouse position in September of this year.

Visiting classes to the Botanic Garden always receive some plants from our children's greenhouse to use in their classrooms

or for experimental purposes. This gift of plants was started years ago and has been a most popular plan. These plants, which are usually varieties of ferns, begonias, geraniums, and ivies, are started and cared for by groups of the older boys and girls. Every week of the year such groups come here at least once each to care for such materials. This is their contribution to the elementary schools of our borough, widespreading in its influence on awakening interest in plant study, and of decided value to the groups concerned. It might be well to state here that we have an increasing number of reports from our boys and girls and from the general public that these older young people are sought for in their own neighborhoods for help and advice in outdoor gardening and in work with house plants. We have raised and distributed to schools 1,505 plants in the manner suggested, but this number does not include plant materials raised in our regular classes, nor does it include stock materials and all the seedlings for our outdoor gardens.

There has been an increase in total attendance at all our classes and lectures from 53,294 in 1920 to 63,104 in 1921, and in our work of outside lecturing from 11,885 in 1920 to 15,581 in 1921. The Department of Elementary Instruction came in touch with 86 per cent. of all the Brooklyn elementary schools during 1921, an increase over the preceding year of 8 per cent.

The boys' and girls' room at the Botanic Garden, a dream of many years, is actually taking shape. It has been formally opened during the last year. A portion of the work, including the laying of the floor and the carpentry work, has been covered by a gift of $1,500 from Mrs. George D. Pratt. The books for the room have been promised in part as gifts from our older boys and girls who are now in business or at college. During the year 1922 we expect to see these shelves filled with such gift books, testimonials of interest and loyalty to this institution.

The Alfred T. White Scholarship for 1921 was presented to Miss Lillian Baker, a June graduate of the Girls' High School, a student and helper at the Brooklyn Botanic Garden ever since our first garden was opened in 1914, and for some three years vice-president of our Boys' and Girls' Club. For some years Miss Baker gave her services in our library, coming weekly to assist

FIG. 9. Group of Girl Scouts arriving at the Brooklyn Botanic Garden for tree study in the winter.

without compensation. She is now attending the College of New Rochelle, and expects to enter the field of science teaching when she graduates.

Miss Elizabeth Elmer, Acting Assistant Curator of Elementary Instruction, resigned in August, and Miss Elsie Hammond assumed the duties of Assistant Curator of Elementary Instruction.

Personal Activities

During 1921, as Curator of Elementary Instruction, I gave 36 outside lectures to clubs, schools, and various organizations.

I attended the meeting of the National School Garden Association held in Atlantic City on March 1 and 2. During the same session I was elected vice-president of the National Council of Garden Teachers, an organization meeting at this same time, and also Secretary of the School Garden Association.

On May 25 I spoke at the meeting of the American Association of Museums at Cleveland, presenting the educational work done here at the Brooklyn Botanic Garden. This was the first time our work has been presented before that association.

During the summer session of Teachers' College I gave a lecture on Gardening to the advanced class in nature study.

This covers my personal activities for the year.

Respectfully submitted,

ELLEN EDDY SHAW,

Curator of Elementary Instruction.

REPORT OF THE LIBRARIAN FOR 1921

DR. C. STUART GAGER, DIRECTOR.

Sir: I have the honor to submit herewith my report as librarian for the year 1921.

In reviewing the work accomplished during the past year, the salient feature is the unusual increase in all phases of the work connected with the library department. Within the year 1,160 volumes were accessioned and prepared for use, as compared with 460 for 1920 and 462 for 1919; 329 volumes were forwarded to

the binder, mainly comprising completed volumes of periodicals, as compared with 255 volumes for 1920. Requests were made to fifty-two state agricultural experiment stations for publications missing from our files. These resulted in the receipt of 937 annual reports, bulletins, circulars, and other titles. These additions to our agricultural experiment station literature materially augment our collection, and we hope to bind completed sets in the near future. Over 4,600 rewritten pamphlet cards were revised and filed into the dictionary catalog, thus making it possible to consult one catalog for all publications in the library. A file of Brooklyn Botanic Garden exchanges was prepared for library use.

On the other hand, the librarian has been unable to make satisfactory progress with the serial shelf list and catalog, due to the increased amount of time spent in checking book catalogs and the increased amount of classifying and cataloging made necessary by current accessions.

Accessions

The accessions prepared for use during the past year numbered 1,160 volumes, 702 pamphlets, and 6,209 parts of publications, as compared with 460 volumes, 537 pamphlets, and 5,454 parts of publications for 1920.

Our library now includes 7,654 volumes, 5,480 pamphlets—a total of 13,140.

Among the larger and more notable accessions of the year may be mentioned: *La Belgique Horticole,* 35 vols.; Buitenzorg, *Mededeelingen uit 's Lands Plantentuin,* 75 vols.; *Centralblatt für Bakteriologie, Parasitenkunde und Infectionskrankheiten,* 2te Abt., 34 vols.; Cooke, *Illustrations of British Fungi,* 8 vols.; *Edwards's Botanical Register,* 34 vols.; *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie,* 50 vols.; Engler & Drude, *Die Vegetation der Erde,* 16 vols.; *Annuaire du Conservatoire et du Jardin Botaniques de Genève,* 19 vols.; *Transactions* of the Illinois State Horticultural Society, 17 vols.; *Report* of the Iowa State Horticultural Society, 12 vols.; Just's *Botanischer Jahresbericht, 72* vols.; *Memoirs* of the Royal Society of London, Being a New Abridgment of the Philosophical Transactions by Mr. Baddam, 10 vols.; *Annual Report* of the Michigan

Academy of Science, 20 vols.; *Annual Report* of the Michigan State Horticultural Society, 36 vols.; New York State Museum, *Report of the Entomologist,* 20 vols.; *Annual Report* of the New York Zoological Society, 18 vols.; New Zealand Institute, *Transactions and Proceedings,* 20 vols.; *Annual Report* of the Wisconsin Agricultural Experiment Station, 16 vols.

The pre-Linnaean collection has been enriched by the following valuable desiderata:

Blagrave's "*Supplement,*" 1667; Brunfels' "*Herbarium,*" 1539–1540; Camerarius' "*Hortus Medicus et Philosophicus,*" 1588; Clusius' "*Rariorum Aliquot Stirpium,*" 1583; Coles' "*Adam in Eden,*" 1657; Culpeper's "*Pharmacopoeia Londinensis,*" 1675; Dodoens' "*Cruydt-Boek,*" 1644; Durante's "*Herbario Novo con Figure,*" 1667; DuPinet's "*Historia Plantarum,*" 1561; two titles by Fuchs, "*Methodus seu Ratio Compendiaria,*" 1541; "*De Historia Stirpium Commentarii,*" 1542; "*Herbolario Volgare,*" 1536; "*Das Kreüterbuch oder Herbarius,*" 1528; Lobel's "*Botanographi sive Plantarum,*" 1605; Lovell's "*Enchiridion Botanicum,*" 1665; Mattioli's "*Compendium de Plantis Omnibus,*" 1571; Paul's "*Quadripartitum Botanicum,*" 1667; Pena & Lobel's "*Stirpium Adversaria Nova,*" 1570; Ray's "*Catalogus plantarum,*" 1660.

Periodicals

The total number of titles received at the present time for the current periodical file is 529, showing an increase of seventy-six for the year. Of the seventy-six new ones, sixty-five are received as exchanges. Thirty are received from foreign sources, the most important of which are listed herewith:

Bulletin de la Société d'Histoire Naturelle de l'Afrique du Nord, Algeria, Africa; *Annali di Botanica,* Rome, Italy; *Papers and Reports of the Government Botanist,* Botanic Gardens, Brisbane, Australia; *Journal of the Department of Agriculture,* Adelaide, South Australia; *Australian Forestry Journal; Bericht,* Bern (Switzerland) Botanic Garden and Institute; *Botanical Memoirs,* ed. by A. H. Church; *Botanische Jahrbücher,* by Engler; *Broteria, ser. Botanica;* Caen, France, Institut Botanique, *Publications; Yearbook of the Planters' Association,* Ceylon (Kandy); *Bulletin*

of the Ceylon Department of Agriculture; Transactions and Proceedings of the Edinburgh Botanical Society; Agricultural Journal of Egypt, Ministry of Agriculture, Cairo, Egypt; *Annuaire du Conservatoire et du Jardin Botaniques* de Genève; *Agricultural Journal of India,* Pusa, India; *Trabajos, ser. Botanica,* Museo Nacional de Ciencias Fisico Naturales, Madrid, Spain; *Anales,* Museo Historia Natural, Montevideo, Uruguay; *Science Bulletin,* Department of Agriculture, New South Wales; *Transactions and Proceedings,* New Zealand Institute; *Meldinger,* Norges Landbrukshoiskole, Aas, Norway; *Proceedings and Transactions of the Nova Scotian Institute of Science;* Paris, Ministère de l'Agriculture *Service des Épiphyties, Annales, Mémoirs; Archivos,* Museo Nacional, Rio de Janeiro; *Bollettino Tecnico,* Rome, R. Istituto Scientifico sperimentale del Tobacco; *Scientific Agriculture,* Gardenvale, Canada; *Bulletin and Journal of the Department of Agriculture,* Union of South Africa, Pretoria; *Verslagen,* as well as the *Vlugschrift,* from the Wageningen Phytopathologischen Dienst; *Agricultural News* of the Imperial Department of Agriculture of the West Indies.

The following state horticultural societies have been added to our file of exchanges:

Arizona, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Maryland, South Dakota, Virginia, Wyoming.

We may also mention as new additions the *American Nut Journal;* University of Illinois, *Biological Monographs and Bulletin of the Laboratory of Natural History;* the *Maine Naturalist, Journal* of the Knox Academy of Arts and Sciences; *Bulletin,* Maryland Academy of Sciences; *Publications,* Nebraska Academy of Science; New York Botanical Garden, *Contributions; Parks and Recreation,* Minot, North Dakota; *Transactions,* Peninsula Horticultural Society, Dover, Delaware; *Portland Roses,* Portland Rose Society; *Bulletin,* Southern Californian Academy of Sciences; *University Publications, Biological series,* Stanford University Library; *Trillia,* as well as *Proceedings,* of the Western Pennsylvania Botanical Society.

Inter-library Loans

During the year twenty-nine publications were loaned to the American Museum, Brooklyn Museum, Carnegie Foundation, Carnegie Institution of Washington, Columbia University, Messrs. Ford, Bacon & Davis of New York, and the U. S. Rubber Co., New York.

The usual collection of books was forwarded to the Biological Laboratory of the Brooklyn Institute of Arts and Sciences, Cold Spring Harbor, for their summer session.

The Garden library borrowed forty-one books for the use of its staff from the American Museum of Natural History, the Brooklyn Museum, the Brooklyn Public Library, the Pratt Institute Free Library, and the Library of the U. S. Dept. of Agriculture, Washington.

Binding

During the past year 329 volumes were bound. Among these were one thousand bulletins of the U. S. Department of Agriculture and its various divisions, bound generally in lots of twenty-five.

The 255 volumes mentioned in the 1920 report as having been forwarded to the binder were prepared for use during the early part of 1921.

Miscellaneous

On September 28, Mr. Ernest Reece, Principal of the Library School of the New York Public Library, conducted a class of over forty Juniors to visit the Garden. The librarian gave a talk on the methods used in the organization and work of the Brooklyn Botanic Garden Library and the arrangement of catalogs and vertical files. Tea was served in Room 330, and the Director and the Curator of Public Instruction both spoke of the work of the Garden. The class was then taken over the grounds by Dr. Graves.

Since December first Miss Bessie D. Donegan has filled the position of library assistant, in place of Miss Helen M. Smith, transferred to scientific assistant.

Miss Florence C. Berry has been assisting the library, since October 24, from nine to twelve, dating, embossing, and cutting pages of publications. Miss Berry also does the required steno-

graphic work, thus relieving Miss Brewster of her one hour a day in the library. The library has thus been receiving daily two more hours of assistance.

Appropriate exhibits of books were held in conjunction with the usual annual functions of the Garden, as well as at the reception tendered Dr. A. H. Graves and Miss Elsie Hammond.

The library was represented at the New York Library Club and at the New York Special Library Association during the past year.

1922

The preparation, classification, and cataloging of new publications, including the collection recently ordered from abroad, numbering over three hundred volumes and pamphlets, will probably constitute a large part of the work for the year.

The binding of serials, as well as shabby and broken-backed books, should, if possible, form one of the important tasks. There is now an accumulation of both books and serials which should be forwarded to the binder at the earliest date possible.

We do not see how, with the amount of work in hand, and no more assistance in the library than we have at present, much work can be accomplished on the serial shelf list and catalog.

For list of donors and gifts see Appendix I (pp. 80–81).

The statistical report follows:

STATISTICAL REPORT ON THE LIBRARY

Accessions

	Volumes	Pamphlets	Parts (Including Periodicals)
Exchange	168	335	3,786
Gift	99	252	1,385
Publication	0	66	152
Purchase	649	49	882
Bindery	244	0	0
Deposit	0	0	4
Total	1160	702	6,209

Total number of parts of publications added to the library during 1921, including current periodicals	6,209
Increase	755

Total number of volumes reported as of December 31, 1920	6,500
Total number of volumes added during 1921	1,160
	7,660
Minus volumes belonging to the U. S. Vocational Board and incorrectly added to our list during 1920	6
Total number of volumes in the library December 31, 1921	7,654
Total number of pamphlets in library December 31, 1920	4,778
Total number of pamphlets added during 1921	702
Total number of pamphlets in library December 31, 1921	5,480
Total number of volumes and pamphlets in library December 31, 1920	11,278
Total number of volumes and pamphlets added during 1921	1,862
Total number of volumes and pamphlets in library December 31, 1921	13,140

Serial Publications

Count of Periodicals, State and Federal Documents, and Society Publications Currently Received During 1921:	
Subscription	58
Gift	48
Exchange	416
Deposit from Brooklyn Public Library	1
Publication	6
Total	529
Increase	76

Miscellaneous Statistics

Torrey Botanical Club index cards on file in the library December 31, 1920	28,954
Added by purchase during 1921	796
Total number of Torrey Botanical Club index cards on file December 31, 1921	29,750
Index Algarum Universalis cards, December 31, 1920	11,549
Added by purchase during 1921	4,055
Total Index Algarum Universalis cards, December 31, 1921	15,604
Cards added to shelf list	823
Cards added to dictionary catalog	1,962
Cards added to pamphlet catalog	631
Cards added to current periodical catalog	213
Cards added to catalog of duplicates	174
Total typewritten cards	3,803

Books loaned to members of staff	956
Number of readers in library, approximately	2,129
Volumes entered in accession book	1,160
Number of letters written	384
Books loaned to other institutions	29
Books borrowed from other institutions	41
Lantern slides on file December 31, 1920	2,784
Lantern slides accessioned during 1921	214
Total number of lantern slides on file December 31, 1921	2,998
Photographic negatives on file December 31, 1920	3,595
Negatives accessioned during 1921	224
Total number of negatives on file December 31, 1921	3,819

Respectfully submitted,

RAY SIMPSON,
Librarian.

FINANCIAL STATEMENTS FOR 1921

I. Tax Budget Accounts

1360 *Personal Service*

Appropriation	$71,241.00
Expended	71,241.00

1361 *Other Codes Than Personal Service*

Line 1 *Fuel Supplies*

Appropriation	$ 7,782.50
Expended	7,782.50

Line 2 *Office Supplies*

Appropriation	$ 500.00	
Transferred from 1361–4	133.40	
	$ 633.40	
Expended	633.40	

Line 3 *Laundry, Cleaning and Disinfecting Supplies*

Appropriation	$ 25.80	
Expended	25.80	

Line 4 *Botanical and Agricultural Supplies*

Appropriation			$ 2,300.00
Expended		$1,847.45	
Transferred to 1361–2	$133.40		
Transferred to 1361–5	45.82		
Transferred to 1361–10	260.40		
Transferred to 1361–12	12.93	452.55	2,300.00

Line 5 *General Plant Supplies*		
Appropriation	$	243.00
Transferred from 1361–4		45.82
	$	288.82
Expended		288.82
Line 6 *Wearing Apparel*		
Appropriation	$	100.00
Expended		100.00
Line 7 *Office Equipment*		
Appropriation	$	323.00
Expended		323.00
Line 8 *General Plant Equipment*		
Appropriation	$	2,400.00
Expended		2,400.00
Line 9 *General Plant Materials*		
Appropriation	$	1,467.50
Expended		1,467.50
Line 10 *General Repairs and Replacements*		
Appropriation	$	1,200.00
Transferred from 1361–4		260.40
	$	1,460.40
Expended		1,460.40
Line 11 *Light, Heat and Power*		
Appropriation	$	253.00
Expended		253.00
Line 12 *General Plant Service*		
Appropriation	$	460.00
Transferred from 1361–4		12.93
	$	472.93
Expended		472.93
Line 13 *Hire of Horses and Vehicles with Drivers*		
Appropriation	$	680.00
Expended		680.00
Line 15 *Telephone Service*		
Appropriation	$	215.00
Expended		215.00

Line 16 *Carfares*

Appropriation		$ 60.00
Expended		60.00

Line 17 *Express and Deliveries*

Appropriation		$ 300.00
Expended		300.00

Line 18 *Contingencies*

Appropriation		$ 500.00
Expended		500.00

Summary of Tax Budget Accounts

Appropriation by City for maintenance	$90,050.80
Expended	90,050.80

II. Private Funds Accounts

1. *Endowment Fund* ($75,500.00) *Restricted in part:*

Income Account:

Income, 1921		$ 3,952.38
Transferred to Endowment Increment Fund	$ 590.61	
Transferred to Special Contributions	3,361.77	3,952.38

2. *Life Membership Fund* ($4,500.00) *Restricted:*

Income Account:

Balance, January 1, 1921		$ 98.54
Income, 1921		190.32
		$ 288.86
Expended	$ 236.22	
Transferred to Endowment Increment Fund	38.05	274.27
Balance, December 31, 1921		$ 14.59

3. *George C. Brackett Library Fund* ($500.00) *Restricted:*

Income Account:

Balance, January 1, 1921		$ 47.56
Income, 1921		26.24
		$ 73.80
Expended	$ 67.91	
Transferred to Endowment Increment Fund	5.24	73.15
Balance, December 31, 1921		$ .65

4. *Benjamin Stuart Gager Memorial Fund* ($10,000.00) *Restricted:*

Income Account:		
Balance, January 1, 1921		$ 502.73
Income, 1921		850.00
		$ 1,352.73
Expended	$ 946.05	
Transferred to Endowment Increment Fund	170.00	1,116.05
Balance, December 31, 1921		$ 236.68

5. *Martha Woodward Stutzer Memorial Fund* ($5,000.00) *Restricted:*

Income Account:		
Balance, January 1, 1921		$ 61.45
Income, 1921		262.52
		$ 323.97
Expended	$ 259.46	
Transferred to Endowment Increment Fund	52.50	311.96
Balance, December 31, 1921		$ 12.01

6. *Mary Bates Spalding Fund* ($2,000.00) *Restricted:*

Income Account:		
Balance, January 1, 1921		$ 50.00
Income, 1921		85.00
		$ 135.00
Expended	$ 0.00	
Transferred to Endowment Increment Fund	27.00	27.00
Balance, December 31, 1921		$ 108.00

7. *Cary Library Fund* ($10,000.00: ⅓ to B.B.G.) *Restricted:*

Income Account:		
Balance, January 1, 1921		$ 3.17
Income, 1921		105.00
		$ 108.17
Expended	$ 67.99	
Transferred to Endowment Increment Fund	21.00	88.99
Balance, December 31, 1921		$ 19.18

8. *Special Fund (Brooklyn Institute Endowment Allotment)*
Restricted:

Income Account:		
Income, 1921		$ 3,525.00
Transferred to Endowment Increment Fund	$ 375.00	
Transferred to Special Contributions	3,150.00	3,525.00

9. *Botanic Garden Collections Fund, 1921. Restricted:*

Transferred from Collections Fund, 1920		$ 214.01
Received from contributions, 1921		6,788.00
Credit from Librairie Scientifique Kundig (1919)		34.81
		$ 7,036.82
Expended	$6,633.88	
Transferred to Special Purposes Account	62.00	
Transferred to Special Contributions	145.16	6,841.04
Balance, December 31, 1921		$ 195.78

10. *Sustaining Membership. Restricted:*

Balance, January 1, 1921		$ 54.14
Received from dues, 1921		366.57
		$ 420.71
Expended	$ 183.17	
Transferred to Endowment Increment Fund	73.31	256.48
Balance, December 31, 1921		$ 164.23

11. *Annual Membership. Restricted:*

Balance, January 1, 1921		$ 34.65
Received from dues, 1921		1,310.00
		$ 1,344.65
Expended	$ 969.44	
Transferred to Endowment Increment Fund	262.00	1,231.44
Balance, December 31, 1921		$ 113.21

12. *Tuition and Sales. Restricted:*

Balance, January 1, 1921		$ 2,134.83
Received, 1921:		
(*a*) Instruction	$3,012.45	
(*b*) Penny seed-packets	2,652.79	
(*c*) Incidentals	140.79	5,806.03
		$ 7,940.86

Expended	$3,035.08	
Transferred to Endowment Increment Fund	1,100.62	
Transferred to Special Contributions	1,000.00	5,135.70
Balance, December 31, 1921		$ 2,805.16

13. *Special Purposes. Restricted by terms of gift:*

Special gifts for Japanese Garden and Bubbler Drinking Fountain:	
Received	$ 951.40
Transferred from Collections Fund, 1921	62.00
	$ 1,013.40
Expended	1,013.40

14. *Special Contributions* (For 1921 only):

Received	$ 195.11
Transferred from Endowment Fund Income Account	3,361.77
Transferred from Special Fund	3,150.00
Transferred from Special Account W	5,000.00
Transferred from Tuition and Sales	1,000.00
Transferred from Collections Fund, 1921	145.16
	$12,852.04
Expended	12,852.04

15. *Special Account W. Restricted:*

Income Account:		
Income, 1921		$10,240.00
Expended	$2,874.86	
Transferred to Special Contributions	5,000.00	
Transferred to Endowment Increment Fund	2,048.00	9,922.86
Balance, December 31, 1921		$ 317.14

16. *Endowment Increment Fund. Restricted:*

Transferred from other accounts	$ 4,763.33
Income, 1921	37.63
	$ 4,800.96
Expended	0.00
Balance, December 31, 1921	$ 4,800.96

Summary of Private Funds Accounts:

Balance, January 1, 1921 ...	$ 3,201.08		
Income, 1921	34,726.01		$37,927.09
Expended	$29,139.50		
Transferred to Endowment Increment Fund	4,800.96	$33,940.46	
Balance on hand December 31, 1921 ..	3,986.63		37,927.09

APPROPRIATION OF TAX NOTES OF THE CITY OF NEW YORK FOR EXTENSION OF UNDERGROUND COAL CELLAR OF BROOKLYN BOTANIC GARDEN AND EXPENDITURES THEREFROM DURING 1921

C.D.P. 200-R

Appropriation		$ 6,598.00
Expenditures:		
Construction of Extension of Cellar ..	$4,627.50	
Blue Prints	17.55	
Pay Rolls	319.48	4,964.53
Balance, December 31, 1921		$ 1,633.47

APPENDIX 1

GIFTS RECEIVED DURING 1921

Collections Fund

James F. Atkinson
Dr. Glentworth R. Butler
Mrs. Edwin M. Cragin
Walter H. Crittenden
Albert De Silver
Otto Ebel
John W. Frothingham
Mr. & Mrs. James M. Hills
A. W. Jenkins
E. R. Kennedy
Mrs. John Bradley Lord
Frank Lyman
H. J. Morse
Henry F. Noyes
George D. Pratt
William A. Putnam
Walter B. Seymour
H. Somers
Mrs. H. B. Spelman
Dr. E. H. Squibb
Herman Stutzer
Clifford S. Trotter
Miss Mary Van Norden
Dr. Edwin G. Warner
Miss Frances White
Miss Harriet White

Total Subscriptions, 1921 ..... $ 6,788.00

Living Plants

Mr. W. W. Ashe (1)
Mr. Frank Bailey (17)
Mr. Charles E. F. Gersdorff, through the American Iris Society,
4 German Iris
Mr. J. A. Grenzeia (2)
Mr. C. H. Hall, through American Iris Society,
8 unnamed varieties of Iris
Hicks' Nurseries,
100 *Syringa Emodi*
100 *Azalea viscosa*
75 Climbing roses
100 Bearberry plants
217 Miscellaneous plants
Mr. J. Kearnan (1)
Mr. Roberts Le Boutillier (1)
Mr. A. L. Miller (1)
Mr. F. R. Pierson (3)
Mrs. Julius Prince (1)
Mr. G. H. Rintelman,
Two Cedars of Lebanon
Mrs. O. A. Runyon, through American Iris Society,
14 Japanese Seedling Iris
Mr. F. M. Schott (1)
Mr. George H. Shull (4)
Mr. Chester A. Smeltzer (1)
Mr. C. M. Townsend (1)
Mr. C. A. Weeks (1)
Mr. John C. Wister, through American Iris Society,
31 Japanese Iris

Phanerogamic Herbarium

Mr. N. Ballalas, Athens. (Through the New York University.)
120 specimens collected at Mt. Athos, Greece.
Mr. Edward A. Behr.
Quercus Rudkini, collected at Point Pleasant, N. J.
Mr. H. M. Denslow.
215 specimens of orchids from the eastern United States.
Mr. William C. Ferguson.
629 specimens from Long Island.
Mr. Albert R. Ledoux.
34 specimens of grasses collected in the United States.
Rev. L. H. Lighthipe.
150 specimens from Texas.

Seeds

Mr. Phillips Abbott (1)
Mr. W. W. Ashe (1)
Mr. Frank Bailey (1)
Mrs. Brooks (4)
Mr. Clement Heaton (60)
Miss Hilda Loines (4)
Prof. D. S. Martin (1)
Mrs. W. H. Peckham (1)
Dr. G. H. Shull (4)
Mr. A. C. Weeks (1)
Dr. H. H. Whetzel (2)
Miss Ethel Woodward (1)

Library

Books

E. G. Blackford, Estate of 2
Miss Eugenie Blank 3
Brooklyn Museum Library 1
Prof. B. E. Fernow 2
Dr. C. S. Gager 14
Dr. A. H. Graves 1
Dr. A. Gundersen 1
Mr. Clyde R. Jeffords 1
Gov. Shinike Kasai 1
Dr. M. T. Lee 2
Lister Institute, London 1
Michigan Geological and Biological Survey 1
New York State Museum 19
New York Zoological Society.. 20
Planters Association of Ceylon . 2
Prof. C. Raunkiaer 1
Rockefeller Foundation 1
Miss Ellen Eddy Shaw 1
Miss Ray Simpson 1
Mrs. Annie Morrill Smith 14
Miss Helen Smith 2
Mrs. L. O. Tiffany 2
Wisconsin Geological and Natural History Survey 1
Wisconsin University Library .. 1
Miss C. J. Young 4

Total 99

Pamphlets

Dr. R. C. Benedict 1
Brooklyn Museum 1
Mr. H. A. Caparn 1
Carnegie Institution of Washington 21
Chicago Academy of Sciences .. 1
Cornell University Library 1
Dr. A. R. Davis 1
Dr. Gertrude E. Douglas 1
M. Jean Dufrenoy 2
Messrs. Dulau & Co. 1
Prof. B. E. Fernow 41
Dr. C. S. Gager 69
Dr. A. H. Graves 7
Prof. W. D. Hoyt 1
Mr. Barrington Moore 27
Mr. H. H. Palmer 1
Prof. G. L. Peltier 1
Prof. C. Raunkiaer 35
Mrs. Annie Morrill Smith 7
Mr. Norman Taylor 31
Dr. O. E. White 1

Total 252

Parts of Publications Exclusive of U. S. Government Publications

Botaniska Institutionen Upsala . 1
Brooklyn Museum 2
Brooklyn Public Library, Reference Department 3
Mrs. Chas. M. Bull 82
Canada Geological Survey 2
Carnegie Institution of Washington 1
Chicago Academy of Sciences . 16
Federation of Societies for Experimental Biology 1
Mr. M. Free 14
Dr. C. S. Gager 84
Dr. A. H. Graves 8
Mr. Barrington Moore 2
Mulford Biological Exploration 5
University of Nebraska, Botanical Seminar 3
New York Academy of Sciences 52
New York City, Department of Health 68
New York State Institute of Applied Agriculture 32
New York State Museum 2
Horticultural Society of New York 1
Prof. W. J. V. Osterhout 8

Mr. W. A. Putnam 5
Prof. C. Raunkiaer 1
Prof. Camillo Schneider 5
Miss Ellen Eddy Shaw 1
Mrs. Annie Morrill Smith 189
Mr. Frank Stoll 2
Mr. Norman Taylor 25

Total 615

To the Department of Elementary Instruction

Flatbush Garden League, Book on gardening (prize for outdoor work).
Gissel, Anna M., $20.
McKee, Mrs. E. H., Hand lenses (prizes for garden work).
Mothers' Club, P. S. 65, Queens, $5.
Mothers' Club, P. S. 97, Queens, $5.
Mothers' Club, P. S. 178, Three rose bushes.
Mulvahill, Mrs., $2 for shrub.
Shaw, Ellen Eddy, Two gold honor medals presented to a boy and a girl in our children's garden, on the basis of character, high honor, and service.
Somner, Mrs. C. A., One rose bush.
Teachers' Class (1921), Brooklyn Botanic Garden, One terra cotta garden image for children's room.
Young, Mabel A., One terra cotta garden image for children's room.

Miscellaneous

Anonymous, for improvement of Japanese Garden, $500.
Anonymous, bubbler drinking fountain for children's garden.
Bailey, Mr. Frank, to Endowment Fund, $500.
Mrs. William D. Buckley, black walnut desk.
Mrs. Lewis W. Francis, Tiffany glass vase for the library.
Mrs. Herman Stutzer, jardiniere and standard.
Miss Abigail Brown Tompkins, South Orange, N. J., landscape, "Wild Asters."
Ward and Gow, 50 Union Square, New York City, 50 colored illustrations of economic plants.
Miss Frances E. White, 2 flower holders.

APPENDIX 2

PUBLICATIONS OF MEMBERS OF STAFF DURING 1921

Benedict, R. C.

—— Nephrolepis nutrition. *Amer. Fern Jour.* 11: 41–43. Oct.
—— Is Botrychium dissectum a sterile mutant? *Amer. Fern Jour.* 11: 53–55. Oct.

—— Recent fern literature. *Amer. Fern Jour.* 11: 27–29. March.

—— Tropical ferns. Pp. 1–8. Sept. (Specially printed in connection with the Fern Exhibition of the Massachusetts Horticultural Society, Sept. 22–25.)

Caparn, Harold A.

—— Increasing a community's park assets. *Parks and Recreation* 4: 195–197. April.

—— State parks. *Nat. Municipal Rev. Supplement* 10: 583–600. Nov.

Free, Montague

—— House plants. *Brooklyn Bot. Gard. Leaflets* **IX**[7]. October 5.

—— Things and thoughts of the garden. Monthly articles in *Gardeners' Chronicle of America.* January to December, inclusive.

Gager, C. Stuart

—— Tenth annual report of the Brooklyn Botanic Garden, 1920. Report of the Director. *Brooklyn Bot. Gard. Rec.* 10: 23–43. April.

—— German surtaxes on scientific publications. *Science* 53: 574–575. June 24.

—— Alfred Tredway White. *Brooklyn Bot. Gard. Rec.* 10: 83–87. July.

—— Special monthly report of the Director, February 10, 1921. *Brooklyn Bot. Gard. Rec.* 10: 94–95. July.

—— How shall the world remember? (Memorial address.) *Alumni Quar.* New York State Coll. for Teachers (Albany) 3: 3–11. July.

—— In memoriam (Alfred T. White). *Jour. Nat. Inst. Soc. Sci.* 7: 145. August.

—— A botanic garden for the children's garden. *Nat. Plant, Flower and Fruit Guild Mag.* 10: 6–7. Sept.

—— A. Augustus Healy. *Brooklyn Bot. Gard. Rec.* 10: 105–107. Oct.

—— Reinheimer's Symbiosis (Review). *Torreya* 21: 85–86. Sept.–Oct.

Graves, Arthur Harmount

—— The collection of water lilies at the Brooklyn Botanic Garden. *Brooklyn Bot. Gard. Leaflets* **IX**[8]. October 19.

—— Various newspaper articles relating to the Brooklyn Botanic Garden.

Gundersen, Alfred

—— Time and sundials. *Brooklyn Bot. Gard. Leaflets* **IX**[5]. June 1.

—— Various abstracts in *Botanical Abstracts* 6–9.

Shaw, Ellen Eddy

—— Report of the Curator of Elementary Instruction for 1920. *Brooklyn Bot. Gard. Record* **10**: 51–57. Apr.

—— Eighth Annual Garden Exhibit for Brooklyn Boys and Girls. *Brooklyn Bot. Gard. Leaflets* **IX**[2]. Apr. 20.

—— John Burroughs. *National Plant, Flower and Fruit Guild Magazine*. June 3.

—— Educational projects. *Brooklyn Bot. Gard. Leaflets* **IX**[10]. November 9.

—— Nature study for children. *Kindergarten Round Robin*. December.

Simpson, Ray

—— Report of the Librarian for 1920. *Brooklyn Bot. Gard. Record* **10**: 57–62. April.

Taylor, N.

—— Britton and Millspaugh's Bahama Flora (Review). *Torreya* **20**: 124–125. January.

—— Hardy's Geography of Plants (Review). *Torreya* **21**: 33. March.

—— Report of the Curator of Plants. *Brooklyn Bot. Gard. Record* **10**: 43–48. April.

—— Across Mongolian Plains, by Roy C. Andrews (Review). The Literary Review of the *New York Evening Post*. May 7.

—— Endemism in the Bahama Flora. *Annals of Botany* **35**: 523–532. October.

—— Harwood's New Creations in Plant Life (Review). The Literary Review of the *New York Evening Post*. November 26.

—— Robert T. Morris's Nut-Growing (Review). The Literary Review of the *New York Evening Post*. December 31.

—— and Moore, B. Plant Composition and Soil Acidity of a Maine Bog. *Ecology* **2**: 258–262. October.

White, Orland E.

—— The Pollination of Flowers. *Brooklyn Bot. Gard. Leaflets* **IX**[3-4]. May 4.

—— John Burroughs. *Brooklyn Bot. Gard. Leaflets* **IX**[6]. June 15.

APPENDIX 3

TALKS, PUBLIC LECTURES, ADDRESSES AND PAPERS GIVEN BY MEMBERS OF STAFF DURING 1921

By the Director of the Garden:

March 3. *The activities of the Brooklyn Botanic Garden.* Men's Club, First Dutch Reformed Church, Flatbush.

April 28. *The nature and importance of botanic gardens.* Biological Club, College of the City of New York.

May 6. *The importance of trees.* At the conference on forestry. New York Bird and Tree Club, Swiss Chalet, Central Park, New York City.

May 10. *The first ten years (of the Brooklyn Botanic Garden) and after.* Seventh Annual Spring Inspection, Brooklyn Botanic Garden.

May 24. *The civic meaning of a botanic garden.* Winter's Night Club, Brooklyn Botanic Garden.

June 7. *Address of welcome to Brooklyn Chamber of Commerce.* Brooklyn Botanic Garden.

Sept. 28. *Organization and work of the Brooklyn Botanic Garden.* New York Library School, annual visit at Brooklyn Botanic Garden.

Oct. 3. *The civic value of a botanic garden.* The Froebel Society, Brooklyn Botanic Garden.

Nov. 2. *The civic value of botanic gardens.* Layman's Club, Cathedral of St. John the Divine, New York City.

Nov. 17. *The possibility of modifying heredity by exposing germ cells of plants to radium rays.* Journal Club, Station for Experimental Evolution, Cold Spring Harbor, L. I.

By the Curator of Plants:

April 12. *Cultivation of American wild flowers.* Princeton Garden Club.

April 12. *Protection of wild flowers.* Princeton High School.

April 27. *Cultivation of woodland plants.* Plainfield Garden Club.

June 19. *Vegetation of Long Island.* New York Botanical Garden.

July 1. *Cultivation of woodland plants.* Illinois Garden Club, Lake Forest.

November 3. *Cultivation of wild flowers.* Elizabeth Woman's Club.

By the Curator of Public Instruction:

October 9. *Health and disease in plants.* New York Botanical Garden.

October 18. *Disease resistance in the American chestnut.* Department of Botany of the Brooklyn Institute. Brooklyn Botanic Garden.

By the Curator of Elementary Instruction:

January 6. *What the Brooklyn Botanic Garden is doing for Brooklyn's children.* Colonia Club.

January 19. *What the Brooklyn Botanic Garden is doing for Brooklyn's children.* P. S. 65, Queens.

February 3. *Useful plants.* P. S. 165. Two assemblies.

March 2. *School garden cooperation.* School Garden Assn. at Atlantic City.

March 29. *Educational work at the Brooklyn Botanic Garden.* Central Congregational Church.

March 30. *Tree planting and gardening.* Staten Island Institute of Arts and Sciences.

March 31. *Care of plants.* Italian Mission.

April 4. *Friends and foes of the garden.* P. S. 169. Two assemblies.

April 5. *School gardens.* P. S. 127, Manhattan.

April 7. *New developments at the Brooklyn Botanic Garden.* P. S. 66, Queens.

April 12. *The outdoor garden.* P. S. 76.

April 14. *The outdoor garden.* P. S. 41.

April 27. *Nature study and its relation to children in their own homes.* P. S. 127.

April 27. *What the Brooklyn Botanic Garden does for boys and girls.* Mothers' Club, Grace Church.

May 3. *What gardens may mean to children.* Lewis Avenue Congregational Church.

May 5. *The work of the Brooklyn Botanic Garden with children.* Flatbush Presbyterian Church.

May 11. *Gardens for little children.* P. S. 104.

May 18. *John Burroughs.* National Plant, Flower and Fruit Guild.

May 19. *Nature study.* Girl Scouts, Erasmus Hall High School.

May 25. *Educational work at the Brooklyn Botanic Garden.* American Association of Museums at Cleveland.

May 27. *Plant life and its meaning to man.* New Paltz Normal School.

June 6. *Hints and helps for the small flower garden.* Staten Island Garden Club.

June 8. *The soil.* Plainfield Garden Club.

June 13. *Home gardens.* P. S. 143.

June 17. *Children's gardens.* P. S. 127, Manhattan.

June 22. *Care of plants.* P. S. 6.

June 24. *What the Brooklyn Botanic Garden does for Brooklyn children.* P. S. 165.

July 25. *The basis nature study should provide for high school biology.* Teachers' College, Columbia University.

September 20. *Bulbs.* Mothers' Club, P. S. 36, Queens.

September 27. *The fall garden.* Garden Club, Orange, N. J.

September 30. *Flower gardens—how children may have better ones.* Mountain Lakes, N. J.

November 3. *A New England Thanksgiving.* P. S. 6.

December 7. *Bulbs.* P. S. 139.

December 16. *Bulbs and their care.* P. S. 41. Two assemblies.

December 22. *Christmas.* P. S. 69.

December 23. *Christmas.* P. S. 36.

By Assistants in the Department of Elementary Instruction:

March 10. *Gardens for little children.* P. S. 180, Miss Elmer, Acting Assistant Curator of Elementary Instruction.

March 16. *Backyard gardens.* P. S. 37, Miss Blank, Instructor.

March 17. *The Brooklyn Botanic Garden and its work.* P. S. 97, Queens, Miss Burtis, Instructor.

March 31. *Small gardens.* P. S. 137, Miss Elmer, Acting Assistant Curator of Elementary Instruction.

By the Associate Curator of Plants:

Dec. 29. *Relationships of Caprifoliaceae, Caryophyllaceae and other families of Dicotyledons.* Before the Systematic Section, Botanical Society of America, in Toronto.

By the Librarian:

Sept. 28. *Methods used in the work of the library of the Brooklyn Botanic Garden.* Junior Class, Library School, New York Public Library, at the Botanic Garden.

By the Horticulturist and Head Gardener:

Feb. 18. *Plants of the Rock Garden.* N. Y. State College of Agriculture, Ithaca, N. Y.

Mar. 9. *Rock Gardens.* Staten Island Horticultural Society, Institute of Arts and Sciences, St. George, S. I.

Mar. 22. *Native Plants for Gardens.* Newport Horticultural Society, Newport, R. I.

Mar. 25. *Plant Propagation.* Garden Club of the Oranges, Orange, N. J.

Oct. 10. *Alpine and Rock Gardens.* Lenox Garden Club, Lenox, Mass.

By the Resident Investigator:

Sept. 24. *Tropical Ferns.* Massachusetts Horticultural Society.

APPENDIX 4

FIELD TRIPS

By the Associate Curator of Plants:

April 30. Brooklyn Institute, Dept. of Botany, Bellaire, L. I.

Sept. 25. Torrey Botanical Club, Bellaire, L. I.

By the Registrar and Custodian:

January 2. Identification of trees, in Prospect Park, for Boy Scouts.

February 6. Identification of trees, in Prospect Park, for Boy Scouts.

March 6. Identification of trees, in Prospect Park, for Boy Scouts.

April 10. Identification of trees, in Prospect Park, for Boy Scouts.

May 1. Identification of trees, in Prospect Park, for Boy Scouts.

May 2. Trees, Shrubs, and Wild Flowers. Woodcraft League, Brooklyn Botanic Garden.

October 1. Brooklyn Institute, Dept. of Botany, Hackensack, N. J.

October 2. Identification of trees, in Prospect Park, for Boy Scouts.

October 8. Identification of trees, in Prospect Park, for Boy Scouts, Bay Ridge district.

October 29. Brooklyn Institute, Dept. of Botany, Flushing, L. I.

November 6. Identification of trees, in Prospect Park, for Boy Scouts.

APPENDIX 5

MEETINGS OF ORGANIZATIONS AND SOCIETIES AT THE GARDEN, 1921

May 20. Flatbush Garden League.

May 24. Winter's Night Club.

June 3. Flatbush Garden League.

June 7. Brooklyn Chamber of Commerce.

July 1. Flatbush Garden League.

September 24. New York Library School, Junior Class.

September 29. Flatbush Garden League.

October 3. Froebel Society of Brooklyn.

October 18. Department of Botany, Brooklyn Institute of Arts and Sciences.

November 17. Flatbush Garden League.

APPENDIX 6

AGREEMENT BETWEEN THE EDITORIAL BOARD OF GENETICS AND THE BROOKLYN BOTANIC GARDEN CONCERNING THE PUBLICATION OF THE JOURNAL "GENETICS"

WHEREAS the Editorial Board of *Genetics* desires the Brooklyn Botanic Garden to become the publisher of that journal; and

WHEREAS the Brooklyn Botanic Garden desires so to cooperate with the Editorial Board of *Genetics*, it is therefore mutually agreed as follows:

1. For the present, and until further agreement otherwise, the period of issue shall be bi-monthly and the total number of pages per volume of six numbers shall not exceed 600, more or less.

2. The Editorial Board agrees to assume all responsibility for securing and editing copy, for forwarding same regularly and promptly to the printers, for the reading and prompt return of proof, and for all other editorial matters.

3. At or near the bottom of the front page of the cover of the journal, and elsewhere, as may subsequently be agreed upon, shall appear the following statement of publication:

Published by the
Brooklyn Botanic Garden
at
(Address of the printers)

4. The Business Manager of the Journal shall be the Brooklyn Botanic Garden, or such officer or member of the Botanic Garden staff as the Director may from time to time designate.

5. Advertisements may be carried on special pages inserted after the scientific articles, and not elsewhere except by mutual agreement. All the cover pages shall, for the present and until mutually agreed otherwise, be reserved for announcements relating to *Genetics*. The advertisements shall be of a character acceptable to both the Editorial Board and the Botanic Garden.

6. No charge is to be made to the Editorial Board for the storage of undistributed copies of the journal at the Brooklyn

Botanic Garden, but if it becomes necessary to pay rental or insurance for storage accommodations outside the Botanic Garden buildings, such rental or insurance shall become a charge against the account of the journal.

7. All publications received in exchange for the journal, except editorial exchanges, shall be deposited in the library of the Brooklyn Botanic Garden, and shall become the permanent property of the Garden, and shall become subject to the regulations governing the administration of the library.

8. If, and whenever, at any time, the gross income of the journal, from all sources (including subscriptions, advertisements, the sale of back numbers and sets, and any subsidies or endowments), shall exceed the necessary expenses of publication, postage, stationery, business office assistance, etc., the surplus, either as principal or as interest on the same, shall be applied to improving the journal, either by increasing the number of pages, or the number or quality of the illustrations, or the quality of the paper, one or all, or in any other way, according as the editors and managements may jointly agree.

9. Three free copies of *Genetics* shall be forwarded to the Managing Editor, but no other free copies shall be issued, except on the basis of exchange, as provided in paragraph seven above.

10. The fiscal year of the journal shall end on November 30, and the Business Manager shall render an annual financial report to the Managing Editor.

11. The Brooklyn Botanic Garden agrees to become responsible for any annual deficit not to exceed Three Hundred Dollars ($300) a year. In consideration of this provision, the choice of printer, and the drawing of all contracts for printing and illustrating shall rest with the business management, and the Business Manager or publisher shall not be liable for any expenses incurred in the name of, nor on behalf of, the journal except by, or with the approval of, the Business Manager.

12. It is understood that no change shall be made in the physical qualities, stock, make-up, or quality of illustrations without mutual agreement.

No copyright shall be placed on the title "Genetics," nor on any of the contents of any issue, except by mutual agreement.

13. It is expressly understood and agreed that, in entering into this agreement, the Brooklyn Botanic Garden does not assume any of the financial obligations incurred by the Editorial Board, nor by the former publishers or printers previous to the date when this agreement shall become effective, nor does the Botanic Garden become liable for any indebtedness to any former printer or publisher incurred by or in the name of the Editorial Board, or by any other party. The Editorial Board hereby absolves the Brooklyn Botanic Garden from all such indebtedness, and furthermore agrees to assume all responsibility relating to any infringement of copyright, and to indemnify the Brooklyn Botanic Garden against any claims or losses that may arise therefrom.

14. In case, and when, this agreement shall terminate the Brooklyn Botanic Garden shall have possession of all over copies of *Genetics,* and shall retain ownership of the exchanges already received, and of such numbers of incomplete volumes of exchanges as are necessary to complete current volumes; but the Editorial Board shall have possession of the mailing lists, and shall have the right to the name of the journal.

15. This agreement shall remain in force for not less than three years from January 1, 1922, and may be terminated by either party only after written notice of intention to terminate shall have been given to the proper official at least one year in advance.

For the Editorial Board:

GEORGE H. SHULL,
Secretary and Managing Editor.

For the Brooklyn Botanic Garden:

C. STUART GAGER,
Director.

BROOKLYN, N. Y.,
December 31, 1921.

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GENERAL INFORMATION

Membership.—All persons who are interested in the objects and maintenance of the Brooklyn Botanic Garden are eligible to membership. Members enjoy special privileges. Annual Membership, $10 yearly; Sustaining Membership, $25 yearly; Life Membership, $500. Full information concerning membership may be had by addressing *The Director, Brooklyn Botanic Garden, Brooklyn, N. Y.* Telephone, 6173 Prospect.

The Botanic Garden is open free to the public daily from 8 a.m. until dark. On Sundays and Holidays at 10 a.m.

Entrances.—On Flatbush Avenue, near Empire Boulevard (Malbone Street), and near Mt. Prospect reservoir; on Washington Avenue, south of Eastern Parkway and near Empire Boulevard; on Eastern Parkway, west of the Museum Building.

The street entrance to the Laboratory Building is at 978 Washington Avenue, opposite Montgomery Street.

A Docent will meet parties by appointment to conduct them through the garden. This service is free to members of the Botanic Garden, and to teachers with classes; to others there is a nominal charge of 25 cents an hour for parties of less than three, and 10 cents a person an hour for parties of three or more. For schedule of regular trips consult the *Prospectus*.

To Reach the Garden take Broadway (B.R.T.) Subway to Prospect Park station; Interborough Subway to Eastern Parkway-Brooklyn Museum Station; Flatbush Avenue trolley to Empire Boulevard; Franklin Avenue, Lorimer Street, and Tompkins Avenue trolleys to Washington Avenue; St. John's Place trolley to Sterling Place and Washington Avenue; Union Street and Vanderbilt Avenue trolleys to Prospect Park Plaza and Union Street.

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DR. ARTHUR H. GRAVES, *Curator of Public Instructton*

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MISS MARY AVERILL, *Honorary Curator of Japanese Gardening and Floral Art*

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MR. HERMAN KOLSH, *Foreman*

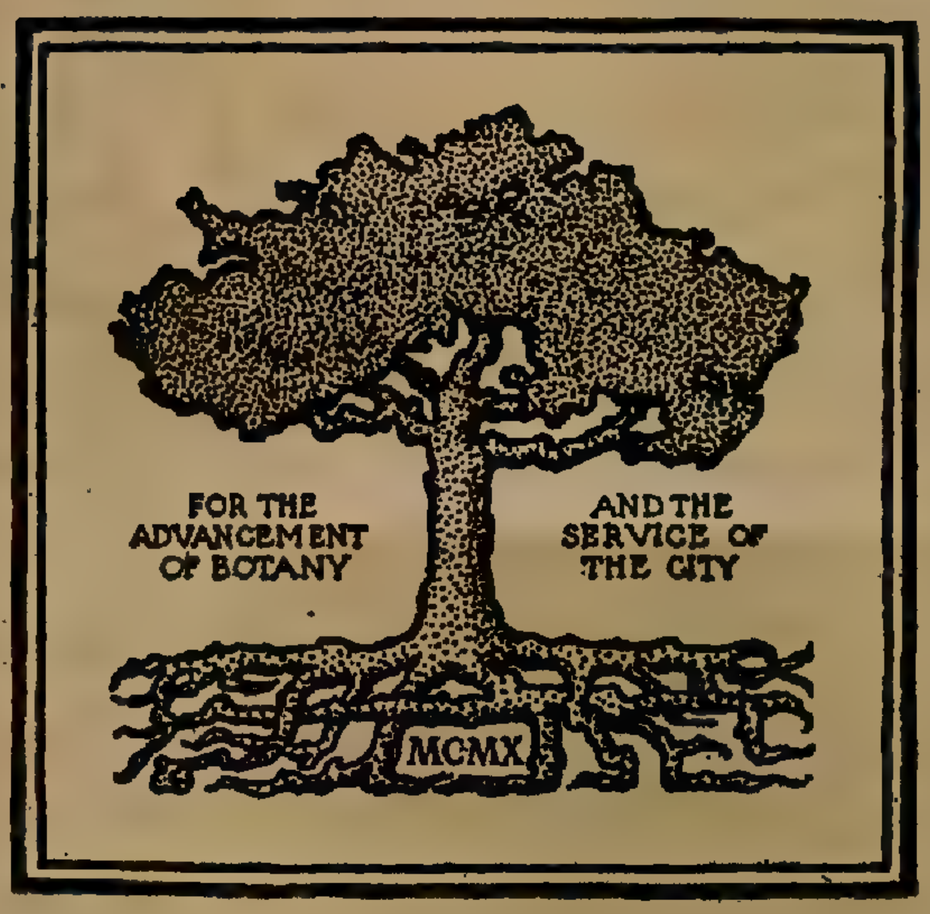
* Resigned, March 31, 1922.

BROOKLYN BOTANIC GARDEN

RECORD

VOL. XI JULY, 1922 No. 3

EDITED BY
C. STUART GAGER



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MR. HERMAN KOLSH, *Foreman*

* Resigned, July 1, 1922.

FIG. 10. A corner of the ten thousand daffodils (*Narcissus* pseudo-narcissus var. "Emperor") in bloom April-May, 1922, with the Laboratory Building in the distance.

THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES

BROOKLYN BOTANIC GARDEN RECORD

VOL. XI July, 1922 No. 3

BOTANICAL EXPLORATION IN BOLIVIA*

Bolivia—the land-locked republic of South America—is richly diverse in representatives of the three natural kingdoms—in minerals, in animals, and in plants, and especially in the latter. The wealth of its plant life as to number of kinds appears to have resulted, at least in part, from local differences in climate, as well as from striking physiographical variations and barriers. For Bolivia is a country of high stony plateaus, snow-capped mountains, deep V-shaped valleys, areas almost bordering on desert, tropical marshes, immense pampas, broad densely forested warm flat valleys, rain forests dripping with moisture from extremely frequent showers, dry, bromeliad-covered, hog-back mountain ridges and park-like areas where the herbaceous vegetation of the pampa (prairies) and the forests of the low-lying, flat river valleys come together—a region in which the trees and shrubs form clumps or islands in an ocean of grass, sedge, and other low-growing plants of the plains.

Crossing the country in an east and west line, one passes from the high plateaus from 11,000–13,000 ft. in altitude, supporting a comparatively dense population of Aymara and Quichua Indian farmers and herdsmen, to the relatively uninhabited tropical wildernesses of forest and pampa that constitute part of the watershed

* Report to the Director of the Brooklyn Botanic Garden on the botanical work of the Mulford Expedition for the Biological Exploration of the Amazon Basin, June 1, 1921, to April 14, 1922. Brooklyn Botanic Garden *Contribution No. 28.*

of the Amazon basin. On the plateaus barley, potatoes, and the English broad-bean (*Vicia faba*) thrive, while the forests of the lowland are rich in the familiar plant families of the American tropics.

During the spring of 1921 arrangements were made for the writer to conduct botanical investigations in Bolivia as the joint representative of the Brooklyn Botanic Garden and The Bussey Institution of Harvard University on The Mulford Biological Expedition. Under the leadership of Dr. H. H. Rusby, dean of the College of Pharmacy of Columbia University, the expedition planned to make biological collections, field studies, and explorations largely on the eastern flanks of the Andes in Bolivia, Brazil, and Colombia. Dr. Rusby has long made the Bolivian flora his special interest, having made several preceding journeys of botanical exploration to South America, crossing the continent through Bolivia in 1885. The area over which we hoped to work comprised that triangular region of the Amazon river system of which the apex is Manaos, and the two basal points, the headwaters of the Madeira river system in Bolivia and those of the Rio Negro in Brazil and Colombia. Originally we expected to spend fifteen months in this work, but, owing to numerous causes, we found it necessary to shorten our time to about ten and one half months, most of which was spent in Bolivia.

We sailed from New York on June 1, 1921, landed at Arica, Chile, on June 20, and arrived in La Paz, Bolivia, the next day, after a trying railroad journey of approximately 21 hours, during which an elevation of over 13,000 feet was attained. From La Paz our party proceeded by rail to Eucalyptus, where, through the courtesy of the Guggenheim Brothers, we were taken by automobile and mules to Pongo de Quime, one of their power stations on the eastern flank of the Andes, the magnificent road taking us through the "Pass of the Three Crosses" (Quimza Cruz) at an altitude of over 15,000 feet.

At Pongo our first serious collecting began, and we found it a botanist's paradise, as most of the plants were in bloom. At this altitude (10,000 feet) we were as yet too high for trees, but the long, narrow, deep valleys were rich in shrubs and herbaceous plants. Yellow calceolarias of two species were very common.

Peperomias and epiphytic ferns were already much in evidence. Tuberous-rooted fuschias in flower peeked out here and there among the rocks overlooking the small stream. Clambering, vine-like composites (*Mutisia*) spread themselves over the low gray-leaved bush, their black and orange flowers reminding one somewhat of the Gazania daisy. Blue-flowered relatives of *Tradescantia* ("Wandering Jew") formed numerous populous colonies along the tiny Pongo river—here little more than a large brook. Selaginellas and Lycopodiums carpeted the damp rocks, two very curious species of the latter being collected. Far up on the dry mountain sides, spikes of bright, peculiar, blue-green-flowered relatives of our century plants made striking groups; and amid this diversity of color and strange perfumes hummingbirds darted and dived about.

From Pongo, where we were much indebted to the Guggenheim representatives in the persons of Mr. and Mrs. H. D. Johnson for a generous hospitality, we traveled by mules up and down cloud-capped, fog-and-rain-soaked mountains through a remarkably beautiful country—the Yungas. Our tons of baggage required several score of mules, and the mountain sides rang with the expletives of our muleteers as the picturesque winding mule train climbed and descended the narrow, rocky trails—trails that often outlined themselves against the steep mountain sides like the zig-zag path of a streak of lightning. And along these trails grew an everchanging profusion of plant life—six-foot fuschia bushes, scarlet with flowers; giant begonias; moss and bromeliad-covered bushes supporting here and there orchids with long sprays of yellow-brown-spotted flowers; deep purple-flowered melastomes (*Tibuchina*), almost as beautiful as our rhododendrons; alder trees on which scarlet-cerise-spiked bromeliads perched by the hundreds. And yet we were still high above the region of palms and monkeys, of rubber trees and Brazil nuts. But we were constantly descending. Each ridge we ascended and descended brought us nearer the tropic lowlands. We seemed to be always encountering the sleepy llama trains with oranges and lemons for the plateau cities, but we left them behind us as we descended below the 5,000-foot elevation.

In this Yungas country the finest coffee in the world is said to grow, and these narrow V-shaped valleys, with the little Aymara

or Quichua Indian villages perched on their sides, are the home and center of the coca (cocaine plant) growing industry, bright green patches of which were bracketed here and there on the steep slopes, their orderly lines of bushes in striking contrast with the tangled and disorderly profusion and confusion of the general vegetation. Little orchards of cherimoya, cyphomandra, and arnotto trees clustered about the villages, while here and there patches of dwarf bananas gave a tropical effect to the landscape, even though palms were lacking. Wild tobacco (*Nicotiana Rusbyi*) and numerous other members of the potato family were common where the trail crossed the valley bottoms. Untamed raspberries clambered over the stony, grassy, low mountain tops, and beautiful Hippeastrums and other Amaryllids made bright spots of color among the ground ferns, as we descended to Cañamina on the 4,000-foot level. Here and at Espia, about 30 miles farther on, we made a stay of several weeks, waiting for balsa rafts to take us down the Bopi River, for Espia is the head of navigation on this route. During our stay at these points we were shown many courtesies by the superintendent of the Cañamina finca, Mr. L. Douillé, and his wife. Until our base camp was established at Espia we were much indebted to them for hospitality.

At Espia and Cañamina we made considerable collections, although the season was not the time of profuse bloom. The valley was rich in orchids, of both showy and inconspicuous-flowered species, but most of them had bloomed in May, at the end of the rainy season. So we saw largely plants in fruit and foliage—some of them magnificent clumps, recalling huge Boston ferns, as with their hanging leafy sprays they perched on the large limbs of trees. Giant cacti of the branched Cereus type were common—some of them over forty feet high. Peperomias, bromeliads, ferns, and several species of cacti shared roosting space on the trees with the orchid family. Bromeliads, in fact, were so common both as perchers and as ground plants that the almost leafless trees on many hillsides were gray with several species of them, while the mountain flanks were exclusively carpeted with them in considerable areas in some places. Perhaps the most striking element of the vegetation in this valley to me were the Erythrinas, sometimes called the hummingbird trees, because their flowers are supposed

to be largely pollinated by these little bright-feathered visitors. Looking down the valley from the vantage point of a mountain flank, one saw amid the dark-green masses of vegetation dazzling spots of henna orange, where two or three giant Erythrina trees reared their domes of almost leafless branches, clothed with sprays of tango-hued flowers, while far up the dry mountain flanks the bromeliad-laden trees made great sweeps of Corot gray. Giant grasses (*Gynerium saccharoides*), related to the pampa grass, made canebrakes here and there along the Miguilla River, while in swampy places giant horsetails (*Equisetum*), an inch through and six feet high, made it easy to visualize the *Calamites* swamps of our ancient Carboniferous days. The dry, sandy, unshaded places in the river bed were covered with a thorny tangle of sensitive-plant bushes, 3–5 feet high, full of magenta flower clusters. Brushing through them, the leafy branches soon appeared almost bare and leafless, as also happens in the case of the little sensitive plant of our gardens (*Mimosa pudica*). In some places along this stream walnut trees (*Juglans boliviensis* ?) were said to be common, and a few nuts resembling our own black walnuts were picked up. Little green parroquets were almost as numerous in this valley as sparrows are here. I often saw their chattering flocks as I went about making collections.

At last the Moseteno Indians arrived from below with the balsa rafts, and we packed and made ready for the descent of the Bopi, Espia being just a bare spot at the head of the raft navigation where the La Paz and Miguilla rivers unite to form the Bopi. Our rafts were made of balsa logs—balsa being about as light as cork. And farther down, where the valleys were broader and the sandbars (*playas*) were more plentiful, these balsa trees (*Ochroma lagopus*) grow in great profusion, as do willows along our own plains' country streams. The rafts, of seven logs each, were lashed together two by two, and soon we had the rather thrilling experience (it reminded me of shooting the shoots or riding the giant racers at Coney Island, except one comes through soaking wet) of descending the snaky-winding, stony, rapid-encumbered Bopi. Four or five days of this found us at Huachi, a small hacienda—once a mission station—at the junction of the Bopi and Cochabamba rivers, which here form the Beni River, a large tributary

of the Madeira River. And it was along the Rio Beni that we did most of our collecting. Our main bases on this stream were Huachi, Rurrenabaque, Rio Ivon, and Cachuela Esperanza, all in Bolivia.

At Huachi, through the courtesy of its owner, Don Elcides Mostaja, we were made comfortable in a large cane-sided, palm-thatched, dirt-floored house—the only kind commonly found in these parts. With this as a base, parties of us made collecting trips in balsas up the Cochabamba some 30 or 40 miles and back up the Bopi a considerable distance. About 18 miles up the Cochabamba River from Huachi lies the Franciscan mission (Covenda), with one priest and perhaps 150 Indians. The country is full of game, which considerably eased our supplies. From Covenda, a hard day's journey up a hog-back rocky ridge, lies the home of two interesting drug plants, known as *coto* and *para-coto* bark. Many worthless barks have been imported and sold in the United States in times past under these names, and the plants themselves from which *coto* and *para-coto* come remain as yet undescribed, only a fragmentary specimen of *coto* having been secured before. I was asked to make the trip up into the rain forest with Indians to secure a complete series of specimens, and fortunately we found *coto* in several fruiting stages and brought back a series of barks of *coto, para-coto,* and some of the related but worthless spurious forms, together with specimens. Another interesting tree of which we secured fruiting specimens is the *ajo-ajo,* or garlic-garlic tree, an enormous forest giant, often 5 feet through, the wood, leaves, and fruit of which have a strong onion or garlic odor, the source of which I have easily identified one eighth to one fourth of a mile away. Both "wild hogs" (peccaries) and fish crave the maple seed-like fruits of this tree—the one rooting among the falling leaves for them, the other nibbling them as they rest on the river surface. In both cases the meat is rendered unfit for eating.

At Huachi two young Bolivian scientists, representing their government, joined us, and the botanist, Señor Martin Cardenas, was extremely helpful to me in my work.

In the last days of September we were again on the move. This time our balsa rafts were headed down the Beni River to Rurrenabaque, a small village about five days distant from Huachi,

situated at the base of the last foothills of the Bolivian Andes. The immediate country about this village is low and flat, except for the contiguous mountains to the southwest. The village itself lies at about 800 feet elevation. To the east and slightly north about 20 miles lies a park-like country of pampa and forest clumps, while still farther on one meets the pampa—a continuation of the Argentine pampa. To the northwest, about 80 miles, lies another stretch of pampa and park-like country, but this pampa region, although considerable in area, seems to be surrounded by forests.

To both these regions we made collecting expeditions—in the easterly direction about fifty miles to Lake Rogoagua, on the shores of which we camped and collected for about a month. The pampa country in its broad general aspect reminded me of our western prairies, though, of course, the plants were different. But the gnarled, twisted limbs and trunks of *Curatella Americana,* with its broad, rough leaves, easily passed, at a distance, for the scrub oaks of our plains. There were palms in groups here and there, though they were by no means a dominant note in the landscape. Ground orchids were plentiful and nine species were collected. A small species of *Zamia,* related to the more familiar "sago palm (*Cycas*), from the stems of which the Indians secure a starch, is common around the edges of the tree "islands." In the marshes one sees acres of a handsome yellow canna. Water lilies are common. Pools and ponds are often completely surfaced with floating *Salvinia* and the miniature fern-like *Azolla.* Water hyacinths (*Eichornia*) abound, as do also members of the arrowhead family. A few days farther north and east the *Victoria regia* occurs. On the drier uplands, grasses are said to be numerous, although the principal species I saw in bloom was probably *Sporobolus indicus.* Grasses of the genus *Andropogon* were not uncommon, especially in the park-like forest areas. In hard gumbo-clay areas, around patches of a papilionaceous thorn bush, portulacas and cacti of several species were in bloom. On the moist boggy banks of certain marshes one walked over carpets of a purple-flowered ally of our snapdragons. In the forest swamps arums and certain species of orchids were common.

Pampa transportation is by means of springless, grease-hungry, two-wheeled oxcarts, the huge solid wheels cut from a cross-section

of a tree. And, as they move, each friction point tries to outdo the others in groans and creaks, while the drivers cry, "Utsa! Utsa!, Hi! hi!" or "he! he! he!" as the occasion warrants. Several dried oxhides serve as a bed or body to hold the baggage and keep it dry when a swamp or a creek is crossed. When the water gets too deep, these carts float and the oxen swim.

Through forests one travels with a motley caravan of half-naked, sweat-streaming, steaming barefoot Indian porters, each of which carries from 50 to 100 pounds. And it was in this manner that we journeyed to the other pampa region mentioned above, stopping at the Indian villages of Tumupassa and Ixiamas, the whole trip covering about three weeks. Along this forest trail the ground vegetation was largely a carpet of ferns and low-growing Acanthaceae with colored leaves, recalling some forms of coleus. On the flanks of some of the mountains were immense bamboo thickets. Among the more interesting forest trees were three or four fruit trees particularly worthy of note. Their Indian-Spanish names were *nui, camaruru, uva del monte,* and *durasno del monte.* The *nui* possibly is related to the cherries and is certainly one of the best wild fruits we found. When I once asked an Indian what the best fruit in these parts was, he answered immediately "El nui, señor." It reminds one of a small juicy plum, sparsely covered with small hairs, perhaps an eighth of an inch long. The single seed is about the size and form of a pistachio nut and the juicy pulp is a sprightly sweet or sub-acid. Both yellow and red fruited forms occur, but the red is the better flavored. The *camaruru* in season is often offered you on entering an Indian house as a sign of hospitality, and its deep yellow-papillated, sub-acid, gelatinous-fleshed fruits are very refreshing on a hot day, even though the two or three seeds are so large that but slight accommodation remains for flesh. *Uva del monte* means "grape of the forest," and the heart-shaped blue fruits with their sweet gelatinous flesh do remind one of grapes, though the tree they grow on is probably a relative of the elms and nettles. Along the path one day, as we traveled, one of our porters picked up a fuzzy-skinned fruit reminding me very much, as to size and shape, of a peach, and the native name is *durasno del monte,* Bolivian-Spanish

for "peach of the forest." The flesh is said to be rich and like a mango, while its single seed tastes like a raw chestnut.

All through the Beni River valley chocolate grows wild, its big, ribbed, pumpkin-colored pods and purple seeds often furnishing a traveling Indian with a refreshing nibble—for these people are like children—they seem to be always eating. The great majority of the wild fruits are sweet, or sweet and oily; some of them have a flavor that reminds one forcibly of axle-grease. All the *genipas* come in this category, according to my experience. Sour fruits are not generally appreciated by the natives for any purpose except for sugared cooling drinks, such as limeade and "tamarindo." "It is good to eat, it is sweet, señor!" is the usual answer to a question as to a fruit's fitness for food. I told them about our grapefruit and they asked me why we planted it, since it was both bitter and sour. A fruit common about Rurrenabaque is the "bibi," a berry fruit with a single seed the size of a rice grain and with a flavor like wintergreen candy. Delicious! Ask the native children, who first called my attention to it! Another fruit much relished by the natives grows on a gorgeous blue-flowered tree, related to our verbenas, and the fruit, both as to size, shape, and flavor, reminds one of olives. In fact, the native name "aceitunilla" means "little olive."

From some standpoints this frontier is much blessed in the character of its plants, for no poison ivy or similar plant annoyer mars a walk through the undergrowth, except the palo santo tree with its stinging ants. And around these trees there is usually a small cleared space that warns one. The forests and pampas are full of valuable economic plants, so valuable to the native that he is able to satisfy most of his needs in the way of rope, soap, food, transportation, fuel, medicine, building material, and even jewelry and cigarette paper from the surrounding forest. For this is the native land of quinine, sarsaparilla, sululu, chicle of some types (the basis of chewing gum), rubber, Brazil nuts, copaiba, arnotto (our butter-color dye), indigo, tree cotton, kapok, and hosts of other raw products.

The Indian makes his bows from the black, tough-wooded *chonta palm,* and the string from the inner bark of a Bombacaceous tree. His arrows are pointed with this same bow wood; shafted

from the flowering stalk of the giant cane (*Gynerium*); threaded with native tree-cotton, glued and waterproofed with chicle, and dyed almost any color with the numerous vegetable dyes. His wife desires a ring, whereupon another species of *chonta palm* furnishes him a black palm-nut, and he sits down on his doorstep or under a tree and makes his gift—a gift so unique and artistic that our own women may well envy the brown-skinned, barefoot possessors.

About the first of February we left Rurrenabaque and made a new base under the hospitable roof of the Suarez Brothers' finca at Rio Ivon. Mr. Hansen, the superintendent, gave us every facility possible for our work and through him we were able to spend about a week collecting along the Ivon River in a covered boat. At this base we first came into intimate contact with the rubber country, although we did see rubber collecting on a small scale as far up the Beni as a day or so below Rurrenabaque. Here, too, we first saw the Brazil nut tree at home.

The first two weeks in March found us still farther down the Beni, this time at Cachuela Esperanza, the main depot and headquarters of the Suarez Brothers, to whom we were again indebted in many ways. Don Nicolas Suarez, the head of the firm, as well as his employees, took a personal interest in our work and showed us many courtesies.

It was here that I first secured the definite information concerning *Caapi* or *ayawasca* that eventually led to my securing a small supply. *Ayawasca,* or *aya-huasca,* as it is called on the lower Beni, is a vine 30 to 40 feet or more high, first described by Richard Spruce in 1853 under the name *Banisteria Caapi* Spruce. He found it common, both wild and cultivated (that is, planted in the mandioca patches), on the upper tributaries of the Rio Negro, perhaps 1,500 miles at least from the region where I secured it. According to the information I obtained from the natives, the vine is not milky-juiced, grows to grand proportions, has greenish-white flowers, large leaves, and blooms in April. The cinnamon-colored, woody, "elbow-knotted" stem is the part generally used, though I was assured several times that every part of the plant could be utilized with effectiveness. Leaves of a small tree or shrub with cranberry-like, reddish-yellow fruits, called *chaco* by

some and *guayavoche* and *cagua* by others (though I am not certain that the two latter names refer to the same plant as *chaco*), are used in preparing the *ayawasca* beverage. Different plants may be used, and I obtained no specimens under the name of *guayavoche* and *cagua*. According to some of my informants, the *ayawasca* is often used alone and this checks up with Spruce's account. In preparing the drink, pounded pieces of the vine *ayawasca* are put in a pot on top of a layer of *chaco* leaves, then another layer of *chaco* leaves, then *ayawasca,* and so on until the pot is full. Water is added and the whole boiled until the liquor is the color of wine. As much as a quart may be taken by one person at a time, if one is used to taking it. The decoction thus made is said to last for a long time when bottled, and is sold for diversion purposes at the fiestas of some of the Peruvian Indians that have come into this part of the country as rubber collectors. The dried stems of the vine are also said to retain their power for at least a year, but the value of the *chaco* leaves vanishes on drying.

Long before I obtained actual specimens, I heard numerous stories about what tribes used it—usually they were distant ones—and definite data were quite difficult to obtain until I reached this place, where, through a Spanish-Indian helper, I was enabled to secure specimens of the vine and what I believe to be fairly accurate information concerning its habitat, rarity, characteristics, preparation, and effect. My information differs in detail from Spruce's account, but in general they check each other. Of course, I did not see any ceremonial usages and I doubt if these people now use it with much of the ancient form. So far as I could gather, they take it for its weird effect, just as some people use whiskey. When I first heard of it, I surmised it might be *hasheesh,* as part of the effect appears to be similar. The effect from drinking *ayawasca* comes with rather amazing rapidity—Spruce says two minutes—and they told me it was *very soon*. The first phase, in general, is a state of courageous drunkenness, though at the very first the Indian turns pale, and there is much trembling. Suddenly he perspires, dances with wild and reckless abandon, and has a boastful, courageous fit, in which he rushes about inflicting violent blows and boasting of what he would do to his enemies, though his blows may fall on his friends in the absence of enemies.

Spruce says this lasts ten minutes, though from what I heard the time must vary with the amount taken and with the individual. Succeeding this phase one grows calm, drowsy, and exhausted; a sleep ensues, during the forepart of which wonderful mirage-like visions of beauty—regular Arabian Nights' pictures—pass before one, panoramic fashion, gorgeous, magnificent sights resurrected and composed of all one has ever thought, read of, or experienced. Finally, this is succeeded by a sojourn comparable to that of sinners depicted in Dore's illustrations in Dante's Inferno. An educated Ecuadorian, cited by Spruce, describes the effect on himself as first that of an aerial voyage through charming landscapes, great cities, lofty towers, beautiful parks, etc. Then "I found myself deserted in a forest and attacked by beasts of prey, against which I tried to defend myself." According to the natives I talked with, one sees beautiful lakes, gorgeous tropical scenery, and, when the wild-beast stage comes on, they again are in a fighting, courageous phase.

In some parts of Brazil and Ecuador in former times, and maybe yet among the but slightly civilized tribes of the upper tributaries of the Rio Negro, the drinking of *ayawasca* was attended by much ceremony. Women were not allowed its use on pain of death, and no boy took it until he had reached "manhood." Medicine men used it for divination purposes—to discover enemy plans, unfaithful wives, and who had bewitched a sick man. Spruce sent specimens to Kew, but apparently nothing has ever been done with them toward discovering the active principle. After the three phases mentioned above, a deep sleep ensues, and I was assured time and again that one awoke usually with no harmful after-effects. Others have told me that, under some conditions, vomiting and diarrhoea may be brought on. Arrangements have been made for obtaining a larger supply of *ayawasca* and, through Dr. Rusby, work for the determination of the active principle will be started.

On March 15, Dr. Mann, Mr. Pearson, and myself left Cachuela for New York, where we arrived April 14. On our journey home we made excellent connections by way of launches, the Madeira-Mamore R.R., the steamer "Tupy" of the Amazon Navigation Co. to Manaos, Brazil, and from there down the Amazon to Para and direct to New York by the Booth line S. S. "Justin."

The joint collections of the botanical contingent of the expedition will number about 13,000 specimens, representing over 2,000 species, many of which are native economic plants. Over 100 species of orchids (dried specimens) and seeds of about 200 species of herbs, trees, and shrubs were collected. In addition to these, many kinds of wild fruits were brought back in formaldehyde solution in two quart jars. An attempt was also made to secure exhibits illustrating the native uses of Bolivian wild plants. The writer was especially interested in the primitive agriculture and customs of the Indian tribes of the Beni region, and notes were taken and information collected with the idea of publishing a paper on this subject. Much photographic material was also secured.

Upon Dr. Rusby's leaving us in December because of ill health, I had charge of the botanical work of the expedition. The Bolivian government, through its president and various other officials, showed us innumerable courtesies, and we were also much indebted to the American representatives of the consular and diplomatic services in Chile, Bolivia, and Brazil.

ORLAND E. WHITE.

EIGHTH ANNUAL SPRING INSPECTION

The Eighth Annual Spring Inspection of the Brooklyn Botanic Garden by trustees, members, and invited guests was held on Tuesday, May 9, 1922, from three-thirty until six o'clock. Weather could not have been more ideal for a garden party; the sky was clear, the air was calm, and the temperature was neither too warm nor too cold. The attendance was the largest in the history of the Botanic Garden—about 500 being present.

The inspection of the grounds started promptly at 3.30 o'clock, the guests following the green and white Botanic Garden flag (presented in 1917 by the Garden Teachers' Association of the Botanic Garden), and the beautiful silk national flag, presented on September 17, 1921, by the Boys' and Girls' Club of the Garden, for use at the spring inspections. The itinerary was as follows:

1. The Japanese Garden.

2. White Oak Circle, where a bronze tablet was unveiled. This tablet marks a white oak planted May 9, 1916, by the late Mr.

Alfred T. White. The tablet contains the stanza quoted at the end of this article.

3. The Rock Garden. The new portion, west of the main walk, was exhibited for the first time.

4. Azalea bank and knoll, with new planting of azalea, rhododendron, and mountain laurel.

5. Children's Gardens.

6. Conservatory Plaza.

7. Laboratory building. Exhibition of twenty-three newly framed portraits, recently added to the Garden's collection of portraits of the makers of botany, from Aristotle to the present.

8. Exhibit of flower plates and batik work with designs from the flora of British Guiana. This exhibit of work by Miss Anna Heyward Taylor combines scientific accuracy with decorative quality in a conventional and naturalistic treatment in decorative textiles of batik and embroidery. The designs were suggested, not only by flowers and entire plants, but also by the cellular (microscopic) structure of stems and other parts as seen in sectional view. So far as known to the Botanic Garden, this is the first time the finer structure of plants has been utilized as a source of design in decorative art.

Tea was served from 4.30 until 6 o'clock in the main rotunda of the Laboratory Building by the Woman's Auxiliary of the Brooklyn Botanic Garden.

At the unveiling of the bronze tablet, Mr. Frank Bailey, who succeeded Mr. Alfred T. White as chairman of the Botanic Garden Governing Committee, spoke briefly of Mr. White's services to the Botanic Garden, and introduced Director Gager, who spoke as follows:

Remarks at the Unveiling of the White Oak Tablet

In his delightful essay on Marcus Aurelius, Matthew Arnold states that "the great record for his inward life was the clear consenting voice of his contemporaries, high and low, friend and enemy, pagan and Christian, in praise of his wisdom, justice, and goodness. . . . Long after his death his bust was found in the houses of men throughout the wide Roman Empire." So with the man who planted this tree; those who knew him best delight most

to pay honor to his memory. And it was very fitting that he should plant a tree, for he was continually initiating institutions or movements destined to grow and to become of increasing benefit to mankind. So this sturdy white oak, significant in name and in character of the name and character of him who planted it, extending its roots down into the soil and moisture, and its leafy branches up into the air and sunlight, will grow in size, casting a grateful shade, becoming an object of beauty in the landscape, and a source of increasing comfort and pleasure to the thousands who shall visit this Botanic Garden.

A tree is, in a very real sense, symbolical of the life of a man like Mr. White, for when it seems to be very much alive, as in spring and summer, we rejoice that we have it; and when it *seems* to be dead, as it does in winter, then we know that it is, in reality, very much alive, conserving its energies and making minute preparation for the reawakening of the spring to come. So with Mr. White; when he was here we felicitated ourselves and the community that we had him; and now that he is gone we realize that his influence still lives in the life and work of this Botanic Garden, and of the numerous other institutions made possible by his initiative and support. And so we take a great deal of pride, as well as pleasure, in dedicating a tablet to mark this tree, which shall become

> "A fresh memorial as each year,
> New life and buds and leaves appear;
> A living monumental tree,
> True type of immortality."

NOTES

Sunday attendance at the Garden during April and May has surpassed all previous records. The figures for some of the larger attendances are as follows: April 30, 8,307; May 7, 8,066; May 14, 8,848. The average Sunday attendance from April 9 to May 28, inclusive, was 7,616.

Spring Courses.—Nineteen persons registered for Dr. Gundersen's course of four lectures on "The Principal Families of

Plants," March 17–31. This course was preliminary to his out-of-door course of eight field trips on "Spring Flowers and Ferns," for which twenty-nine persons registered.

Sixty-six persons registered for Dr. Graves's course on "Trees and Shrubs of Brooklyn and Vicinity." This course consisted of ten outdoor lessons in the Botanic Garden and elsewhere in Greater New York, supplemented by preparatory lectures and conferences. The class met on Saturday afternoons from April 8 to June 10.

Boys' and Girls' Club.—At a meeting of the Boys' and Girls' Club of the Brooklyn Botanic Garden on Saturday morning, February 4, silver pins were conferred on nine boys and five girls, who reported on the following topics, each boy or girl having made a special study of one of the topics during the preceding three months: Ageratum, Algae, Bacteria, Bracket Fungi, Ferns, Monocotyledons, Pollination, Papyrus plant, Sisal fiber, Manila hemp, Edible banana, Bag-worm, Our Japanese Garden, Some of the Japanese temple trappings. At the meeting on April 1 a group of seventeen boys and girls gave illustrated talks on various operations of planning and preparing gardens. At this meeting, and also at one held April 22, silver pins were awarded for special work of merit in the various children's courses at the Botanic Garden. Silver pins are awarded only to those who have previously been awarded bronze pins.

Alfred T. White Scholarship Award.—At a meeting of the Boys' and Girls' Club in the Auditorium, Saturday morning, June 10, the Alfred T. White scholarship was presented for the third time. The recipient was John J. Wille. This scholarship of One Hundred Dollars in cash was established by Mr. White as one of the means of encouraging the interest of boys and girls in the study of plant life. The recipient must have done work of superior excellence for at least three years in the Botanic Garden, must present a certificate from his or her high-school principal of satisfactory school work, especially in biology, and must give assurance of intention of entering some college, and of specializing in some phase of plant study, such as botany, forestry, horticulture, et cetera.

Storm Damage.—The tornado-like wind that accompanied the heavy rain of Sunday, June 11, did considerable damage in parts of Long Island, Manhattan, and New Jersey, but comparatively little in the Botanic Garden. One large cherry tree on the hill opposite the north end of the Laboratory building and a medium-sized *Ailanthus* near the Reservoir gate on Flatbush Avenue were blown over and uprooted, and a large Lombardy poplar at the north end of the Wild Flower Garden was broken off near the middle. The other damage was slight.

Conservation Week.—The week of Sunday, April 2, to Saturday, April 8, was observed as "Conservation Week" by the New York City Federation of Women's Clubs under the presidency of Mrs. Richard M. Chapman. The Chairman of Conservation was Mrs. Charles Cyrus Marshall. Programs were given every afternoon, and on some days in the morning, in the Boroughs of Manhattan and Brooklyn. The session on Saturday morning was at the Children's Museum, Brooklyn, and in the afternoon in the Auditorium of Borough Hall, Brooklyn. The program Saturday afternoon was as follows: "The Contributions of the Brooklyn Botanic Garden to the Conservation Movement," Dr. C. Stuart Gager, Director of the Garden; "Water Power," by Mr. Edward H. Sargent, Sr., Assistant Engineer, Bureau of Water Power; and "Conservation of Child Life," by Dr. Laura Reigelman.

Botanic Garden Dinner.—Dr. O. E. White, who has been absent for botanical exploration in the Amazon Basin since June 1, 1921, returned to the Botanic Garden on April 13. An account of the trip occurs in this issue of the RECORD. In recognition of Dr. White's satisfactory trip and safe return, a dinner was held in the Rotunda of the Laboratory building on the evening of April 20. The dinner was attended by all persons on the monthly payroll of the Botanic Garden and a few invited guests. There were about 57 covers. Following the dinner Dr. White gave an interesting popular account of some of his experiences in crossing South America from the west to the east coast. A dinner was also given to the returned members of the expedition and their friends by the H. K. Mulford Co., at the Manufacturers' Club, Philadelphia, on May 24, 1922.

Appreciation from "Horticulture."—"Would that every city had an institution like the Brooklyn Botanic Garden. This institution is of tremendous value to the horticultural industry, as it helps to create a wider appreciation of the flowers and a better knowledge of the way in which to handle them. It carries on classes throughout the year in which anybody with a common school education can obtain practical instructions on botany, propagation of plants, the handling of flowers in the greenhouse and outside, and the like. Trips are made to nurseries, private places, and other gardens once a month. Garden plans and floral decorations are studied at first hand. Lectures are given by well-known men in the horticultural world and an opportunity offered to get in touch with the leaders in the profession. In addition, the Garden cooperates with the local schools, members of its staff give lectures to the pupils, and open the greenhouses for classes from the schools. It sells many packets of seeds and supervises home gardens. It has a course of instruction in the making and management of children's gardens and in nature study. Likewise it has courses for teachers, and altogether offers educational features seldom found in any institution outside of a college."—*Horticulture* 35: 245. May 25, 1922.

Among recent visitors to the Botanic Garden are the following: Dr. Morten P. Porsild, director of Den Danske Arktiske Station, Disko, Greenland (Feb. 23); Dr. Paul S. Galt, U. S. Bureau of Fisheries, Washington, D. C. (March 6); Prof. F. E. Melchers, Agricultural College, Manhattan, Kansas (March 22); Miss Julia Whiton, Rochester, N. Y., City Training School (March 29); Prof. J. P. Lotsy, Research Fellow, Dutch Academy of Sciences, Velp, Holland (April 13); Dean J. W. Toumey, Yale Forestry School, New Haven (April 13); Prof. Clifford C. Glover, College of Pharmacy, University of Michigan (April 15); Prof. Charles L. Bristol, New York University (April 27); Prof. D. H. Campbell, Stanford University (May 25); Miss Kahler, Denmark (June 1).

Boston Florist Cooperates in Wild Flower Preservation.—"Much interest has been created by the announcement that Carbone, Inc., one of the biggest florist concerns in New England, has

decided to abandon the use of laurel in its decorative work, and that it also will cease to sell Mayflowers. This decision came about as a result of the agitation over the threatened extinction of the wild growth of New England. The Legislature failed to pass the bill asked for to prevent the commercializing of the Mayflower, but the Carbone Co. decided that public sentiment was against the sale of these flowers, and so gave them up.

"Then came the question of laurel, which is, of course, a very much more important item. All florists use great quantities of this material, tons of it being employed at the Carbone store in the course of a year. This store, however, caters to a Back Bay clientele, made up largely of people who have joined the newly formed society for the preservation of wild flowers and who heartily approve the action taken. The date for beginning the innovation was set ahead because orders had already been taken for work during June which involved the use of laurel.

"Undoubtedly the Carbone Co. is the first concern in the country to take such action as that stated, and florists everywhere will watch with interest to see how it solves the problem thus presented. The Carbone Co. has decided to make the experiment for a term of five years, and believes that in the meantime it will have learned how to obtain and use other materials equally satisfactory. It plans to utilize the products of evergreen trees, magnolias from the South, and other such foliage as can be obtained without permanent damage being done to the country's native plants."—*Horticulture* **35**: 241. May 25, 1922.

A New Botanic Garden in Holland.—We are advised by Dr. A. Pulle, professor of systematic botany, University of Utrecht, Holland, that the university has come into the possession of a second botanic garden. This property has been presented to the Botanical Department of the Utrecht University by the heirs of the late August Janssen, deceased in 1919. This well-known business man and philanthropist founded these gardens in 1905 in the neighborhood of his country residence "CANTON." The park, which has been baptized "CANTONSPARK," is situated at the outskirts of the village of BAARN, at a distance of about 18 km. from Utrecht. The buildings of the park are a gardener's cottage and

several hothouses. On these grounds Mr. Janssen brought together several rare and curious plants and gradually augmented this collection in the course of the years. As a matter of fact, the gardens are as yet not in all respects adapted for purposes of instruction and research; they contain, however, already many important specimens. Professor Pulle has been appointed director of this new garden, while Professor F. A. F. C. Went retains the directorship of the Botanical Gardens in Utrecht.

The Old Linnean Garden at Upsala.—The *Bulletin of Miscellaneous Information,* Royal Botanic Gardens, Kew, No. 6, 1920, contains the following interesting paragraphs by C. Skottsberg:

"The new Swedish Linnean Society, as a most important aim for its efforts, has decided to restore Linnaeus's botanical garden. This little place, the pride of Linnaeus and famous at his time, was abandoned on the establishment of the new garden more than a hundred years ago, and was allowed to fall into decay. The conservatories were later used as an archeological museum and Linnaeus's house was occupied by the Director of Music at the University.

"The garden is now being restored to the original plan, and will be planted only with species grown there by Linnaeus himself. The work has been completed in its general outline, and the garden was opened to the public last May. Linnaeus's house, where he died, will be converted into a museum as a memorial of him which will be supplementary to his country house at Hammarby, familiar to several British botanists. Fortunately his personal belongings have remained in the hands of his few descendants, and it has been possible for the Society to acquire a rich collection, including furniture, porcelain, clothes, etc., so that it is hoped that the old house, which has been left practically untouched, will give a good idea of the surroundings in which he lived and worked. Upsala will no longer be in want of a memorial worthy of its greatest son. The necessary funds are being collected among members of the Society. Dr. R. Sernander and Dr. O. Juel, Professors of Botany, have taken great pains to find out all the details of the old garden and of its contents. The place is now in charge of Professor N. Svedelius."

The Knox Arboretum and Botanic Garden, between Thomaston and Warren, Maine, is being developed under the auspices of the Knox Academy of Arts and Sciences. This institution, established in 1908, now has sixty acres, but the director, Mr. Norman W. Lermond, states that this area will, in time, be increased to 100 acres and possibly more. There is a growing library and herbarium, and the trees are to be grouped systematically by families. There has already been published a "*List of trees and shrubs in Knox Arboretum.*"

La Societe National d'Horticulture, France, held on May 26 to June 2, at the *Jardin d'Acclimatation,* the first of two international horticultural exhibitions for 1922. The exhibition was devoted to roses, flowering shrubs and herbaceous plants, forced fruits, legumes, horticultural industries, and horticultural beaux-arts, etc. The second exhibit, to be held from October 26 to November 5, 1922, will be reserved for chrysanthemums, flowering plants of the season, fruits, fruit-tree arboriculture, legumes, and horticultural industries and beaux-arts. All horticulturists, arboriculturists, kitchen gardeners, tradesmen, professionals, and amateurs of every allied and neutral country are invited to participate. There will be a congress, excursions, horticultural conferences, etc. A full program may be obtained by writing to 84 Rue de Grenelle, Paris—7°.

World List of Scientific Periodicals.—The Conjoint Board of Scientific Societies, Burlington House, London, W. I., has issued, under date of February 27, 1922, a circular letter which reads, in part, as follows:

"The Conjoint Board of Scientific Societies proposes, if sufficient support is obtained, to arrange for the issue of a world list of periodical publications which contain the results of original scientific research.

"The list will be an octavo volume containing, in alphabetical order, the titles and places of publication of all such periodicals in existence on January 1, 1900, and of all issued after that date.

"Libraries in London, Oxford, Cambridge, Edinburgh, Dublin, and Aberystwith which take in these periodicals will be indicated in the list, and, in the case of rare periodicals, not taken in by any

of the libraries dealt with, an effort will be made to indicate at least one library in the United Kingdom, whether situated in these towns or not.

"The copies will be printed on one side only to facilitate alterations and additions.

"The objects of the proposed volume are:

"(1) To supply as nearly as possible a complete list of current scientific periodicals.

"(2) To indicate, where possible, at least one library where each periodical is taken.

"(3) To form a basis for cooperation between libraries, so that both the number of duplicates and the list of periodicals not taken in may be reduced.

"(4) To enable each library to use the list for its own purposes, by placing a mark against the title of each periodical it possesses, by cutting up for a card index, etc.

"The Trustees of the British Museum, recognizing the importance of this work to scientific research and bibliography, have consented to allow the compilation to be undertaken by the Staff of the Museum. They are unable, however, to defray the cost of printing and publication.

"Although the value of a list of this kind to libraries and scientific societies would be very great, it is scarcely possible that the production of so costly a work would be entertained by a publishing firm as an ordinary commercial enterprise. If, however, a sufficient number of libraries and institutions agree in advance to purchase one or more copies, when issued, the compilation of the list will be put in hand at once. Already a large bulk of material has been collected in the British Museum, by various societies, and by the Conjoint Board."

The price of the proposed publication will be £2 2s. net.

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GENERAL INFORMATION

Membership.—All persons who are interested in the objects and maintenance of the Brooklyn Botanic Garden are eligible to membership. Members enjoy special privileges. Annual Membership, $10 yearly; Sustaining Membership, $25 yearly; Life Membership, $500. Full information concerning membership may be had by addressing *The Director, Brooklyn Botanic Garden, Brooklyn, N. Y.* Telephone, 6173 Prospect.

The Botanic Garden is open free to the public daily from 8 a.m. until dark. On Sundays and Holidays at 10 a.m.

Entrances.—On Flatbush Avenue, near Empire Boulevard (Malbone Street), and near Mt. Prospect reservoir; on Washington Avenue, south of Eastern Parkway and near Empire Boulevard; on Eastern Parkway, west of the Museum Building.

The street entrance to the Laboratory Building is at 978 Washington Avenue, opposite Montgomery Street

A Docent will meet parties by appointment to conduct them through the Garden. This service is free to teachers with classes, and to members of the Botanic Garden and to their friends when accompanied by members. No trips will be taken with parties of less than six adults. For schedule of regular trips consult the *Prospectus*.

To Reach the Garden take Broadway (B.R.T.) Subway to Prospect Park station; Interborough Subway to Eastern Parkway-Brooklyn Museum Station; Flatbush Avenue trolley to Empire Boulevard; Franklin Avenue, Lorimer Street, and Tompkins Avenue trolleys to Washington Avenue; St. John's Place trolley to Sterling Place and Washington Avenue; Union Street and Vanderbilt Avenue trolleys to Prospect Park Plaza and Union Street.

PUBLICATIONS
OF THE
BROOKLYN BOTANIC GARDEN

RECORD. Established, January, 1912. An administrative periodical issued quarterly. Contains, among other things, the *Annual Report* of the directors and heads of departments, special reports, announcements of courses of instruction, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Garden. To others one dollar a year; 25 cents a copy.

MEMOIRS. Established, July, 1918. Published irregularly. Volume I, *Dedication Papers:* comprising scientific papers presented at the dedication of the laboratory building and plant houses, April 19–21, 1917. Price $3.50, plus postage.

CONTRIBUTIONS. Papers originally published in botanical or other periodicals, reissued as "separates," without change of paging, and numbered consecutively. This series includes occasional papers, as well as those embodying the results of research done at the Garden, or by members of its staff or students. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume.

16. *Flora of the vicinity of New York.* 6 pages, fig. 1. 1917.

17. *Endophyllum-like rusts of Porto Rico.* 9 pages, 3 plates. 1917.

18. *Inheritance of endosperm color in maize.* 11 pages. 1917.

19. *Studies in inheritance in Pisum. II. The present state of knowledge of heredity and variation in peas.* 102 pages. 1917.

20. *Inheritance studies in Pisum. III. The inheritance of height in peas.* 7 pages, fig. 1. 1918.

21. *A sketch of plant classification from Theophrastus to the present.* 16 pages. 1918.

22. *A basis for reconstructing botanical education.* 6 pages. 1919.

23. *Plant families: a plea for an international sequence.* 9 pages. 1920.

24. *Plants and animals of Mount Marcy, New York.* 69 pages, 1 plate, 22 figs. 1920.

25. *Endomism in the Bahama flora.* 10 pages, fig. 1, 1921.

26. *Plant composition and soil acidity of a Maine bog.* 4 pages, 1921.

27. *The origin of new varieties of Nephrolepis by orthogenetic saltation. II. Regressive variation or reverson from the primary and secondary sports of Bostoniensis.* 18 pages, 6 plates. 1922.

LEAFLETS. Established, April 10, 1913. Published weekly or biweekly during April, May, June, September, and October. The purpose of the *Leaflets* is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Free to members of the Garden. To others, fifty cents a series. Single numbers 5 cents each.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication.

SEED LIST. Issued in December of each year.

AMERICAN JOURNAL OF BOTANY. Established, January, 1914. Published, in coöperation with the BOTANICAL SOCIETY OF AMERICA, monthly, except during August and September. Subscription, $6.00 a year.

ECOLOGY. Established, January, 1920. Published quarterly in coöperation with the ECOLOGICAL SOCIETY OF AMERICA. Subscription, $3.00 a year.

GENETICS. Established, January, 1916. Bi-monthly. Subscription, $6.00 a year.

BROOKLYN BOTANIC GARDEN

RECORD

VOL. XI OCTOBER, 1922 No. 4

EDITED BY

C. STUART GAGER

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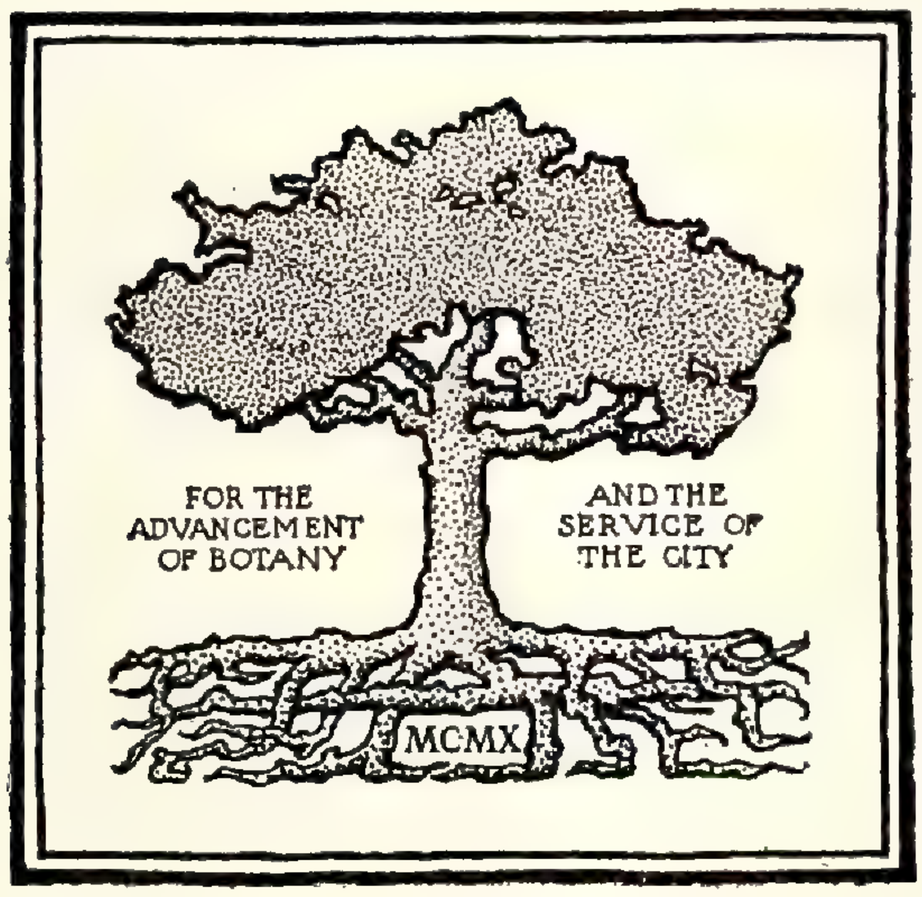

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THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES

BROOKLYN BOTANIC GARDEN

RECORD

VOL. XI October, 1922 No. 4

THE FIRST "BOTANIC" GARDEN IN BROOKLYN

The RECORD for October, 1912, contained an account of "The first botanic garden on Long Island, namely, the Linnaean Botanic Garden of William Prince, at Flushing." In the RECORD for October, 1918, there was given "A brief history of the botanic garden idea in Brooklyn," being an account of the abortive attempt, in 1855, to establish "The Hunt Horticultural and Botanical Garden" (otherwise known as the Brooklyn Hunt Botanical Garden), and the plan of Egbert L. Viele, proposed to the Commissioners of Prospect Park in their *First Annual Report* (1861), for a botanic garden in Prospect Park.

There has since come to the attention of the writer two notices of another and still earlier "botanic" garden in Brooklyn, established in 1825 by Andre Parmentier. This garden is referred to in Stile's *History of the City of Brooklyn* (Vol. II, pp. 173–174, Brooklyn, 1869), from which the following quotation is taken:

"Andre Parmentier, born at Engheim, department of Jemmapes, province of Hainault, in Belgium, July 3d, 1780, was of a highly respectable family, and enjoyed the advantages of a liberal education. His relative, Anthony Parmentier, was the individual that introduced the potato in France. Pecuniary losses induced Mr. Parmentier, who was a merchant, to come to this country, in 1824. Stopping a while in New York City, he was finally induced by his passion for botanical pursuits, to devote himself to gardening on a scale heretofore almost unknown in this section. Refusing the

superintendence of the once famous Elgin Botanic Garden of New York,* which was urgently pressed upon him by Dr. Hosack and others, he selected and purchased in Brooklyn, this tract of twenty-five acres, lying between the Jamaica and Flatbush roads,† on the 4th of October, 1825, for the sum of $4,000. Although beautifully and advantageously located, the surface of these grounds was a bed of rocks, some of which were used in enclosing the garden with a wall. In a brief time, Mr. Parmentier erected a dwelling and garden house, and stocked the land with a great variety of trees and plants, useful and ornamental, indigenous and exotic. The garden soon grew into importance and developed beauties, which attracted large numbers of visitors, from all quarters. In this garden the *Morus Multicaulis* plant was first introduced into America by Mr. Parmentier, whose enthusiastic devotion to floral pursuits promised brilliantly for his own interests, as well as for the public benefit. But, to the great regret of all who knew him, and who sympathized with his hopes and aspirations, he was cut off by death, on the 27th of November, 1830, after a brief illness. His estimable widow, who is still living in this city, strove hard to continue the business; but failing in her endeavors, in consequence of the death of her only son, was finally obliged to dispose of the trees and plants, and the grounds, once occupied by their attractive garden, were cut up into building lots and streets."

There is another account of Parmentier's garden in the *Records* of the U. S. Catholic Historical Society, p. 440, December, 1904, by Thomas F. Meehan. From that article the following quotation is taken:

"Andrew Parmentier was born in Enghien, Belgium, July 3, 1780. His father, Andrew Joseph Parmentier, was a merchant in the linen trade and filled large contracts for Napoleon's army. His elder brother Joseph was an enthusiastic landscape gardener and had charge of a park of three hundred acres at Enghien. This park was a most elaborate display of botanical and horticultural magnificence, laid out with all the advantages of landscape additions. Here Andrew Parmentier became skilled in horticul-

* The Elgin Botanic Garden was established in 1801 by Dr. David Hosack on Murray Hill, just north of the present site of the Grand Central Terminal.

† Now Fulton Street and Flatbush Avenue.

ture under the tuition of his brother, a man of continental repute as a horticulturist and landscape gardener, who died April 1, 1852, in his seventy-seventh year, after a long tenure of the direction of the part of Enghien for the noble house of Arenberg, to which it now belongs.

"Upon a division of the family estate, which was not inconsiderable, Andrew Parmentier came to New York in 1824. . . . He was persuaded to remain in New York as a place where his abilities and scientific training would meet recognition. Accordingly, on October 4, 1825, he purchased for $4,000 a tract of twenty-three acres of land, between the Jamaica and Flatbush roads, on the outskirts of what was then the village of Brooklyn, and now one of the most desirable residential sections of that populous borough. Here he built a house and laid out the land with all the taste and skill he had acquired abroad. He saw the splendid possibilities of the fruitful Long Island soil for a horticultural park, and intended making his purchase the foundation of a colony of his fellow countrymen. Round this garden he built a high stone wall, inside of which he planted a hedge of flowering shrubs. The natives who did not understand or appreciate his plans thought all this a piece of folly and used to call him 'the crazy Frenchman.'

"Under his care the gardens flourished and became famous in a short time, not only in New York, but over the entire country, and his services as an expert in laying out pleasure grounds were sought for in many places North and South. He was the first to introduce into the country the black beech tree and several varieties of shrubs, flowers, vegetables and vines. His announcement in the Baltimore, Md., *American Farmer* of October 16, 1829, reads:

"'Andrew Parmentier, proprietor of the Horticultural and Botanical Garden, Brooklyn, New York, at the junction of the Flatbush and Jamaica turnpike, two miles from the ferries, offers twelve of the most select table grapes, very hardy, of the North of France, at $6 the dozen, with directions for planting, etc., or at seventy-five cents a piece separately—such as they are described in his catalogue. . . . He has a choice assortment of 242 kinds of apples, 190 kinds of superior pears, 71 cherries, 64 peaches, 15 nectarines, 85 plums, 15 apricots, 20 gooseberries, etc., some of

very large size and in a fine bearing state. Also apple trees, paradise stock, full of fruit. His collection of ornamental and forest trees and of ornamental shrubs is of 396 kinds and more than 200 rose plants and a fine collection of greenhouse plants. A. P. will undertake to lay out pleasure grounds and gardens and will be happy in showing his portfolio to amateurs at his establishment and nurseries.

"'. . . In an account of the annual banquet of the New York Horticultural Society, printed in the *Evening Post* of September 1, 1825, it is stated that "the dessert furnished a more rich and beautiful display of horticultural products than has ever before been exhibited in this city," and it goes on to describe some of them:

"'Mr. Parmentier, the enterprising proprietor of the new Botanic Garden in Brooklyn, presented a real Magnus Muskmelon raised in his garden weighing forty-nine pounds and measuring thirty-eight inches in the circumference of the centre and forty-nine inches circumference of the ends. Also a Cantelope Melon from Greece, one from Malta, and another from Mogul. He also furnished a large basket of *Basselle,* which, according to his directions, was cooked like the ordinary spinnage of our market. This Basselle is from Malabar, is much used in China and is a great addition to our excellent vegetables, and of which those who partook found it to be excellent.'"

In both the Parmentier and the Prince, and also in the Hunt gardens, one notes that the chief interest was horticultural and economic, the institutions being more in the nature of nurseries than of scientific and educational institutions like the Botanic Gardens of today.

C. Stuart Gager

HISTORICAL NOTE CONCERNING THE BROOKLYN HUNT BOTANICAL GARDEN

In another article in this issue of the Record on "The first 'botanic' garden in Brooklyn," reference is made to the unsuccessful attempt of the Brooklyn Horticultural Society, in 1855, to establish a botanic garden in Brooklyn, on land now included between Fifth and Sixth Avenues and 57th and 60th Streets.

The Botanic Garden Library has just received, as a gift from the library of the Brooklyn Museum, a copy of the "Second annual address delivered before the Brooklyn Horticultural Society, by the president, John W. Degrauw, Esq., December 6th, 1855." The following quotation from this address (pp. 4–6) contains further information concerning the attempt to establish "The Hunt Botanical Garden" and the complete failure of the plans.

"The Society have made some outlays in the effort to establish a Botanical Garden, commensurate with the requirements of science, as well as to add a most beautiful adornment to our city. In view of this important subject, an early application was made to the Legislature for an Act of Incorporation. While the bill was progressing before that body, a proposition was presented to the Society by Mr. Thomas Hunt, to present the Society with a suitable piece of land, and likewise to subscribe six thousand dollars in furtherance of the design, provided that a stock company was created with a cash capital of fifty thousand dollars. The land offered, was examined by the most competent judges, and they reported—'That the cost to prepare it for a Botanical Garden would far exceed the value of the land, independent of a clause that would require an outlay of fifteen thousand dollars.' Under these circumstances the Society respectfully declined the donating of the ground to them for the purpose proposed.

"A short time after this occurrence, Mr. Hunt submitted a second proposition. The substance of which was, that William C. Langley, Henry A. Kent and himself, were the owners of three blocks of land, containing fifteen acres, and bounded by the Fifth and Sixth Avenues, in the City of Brooklyn, near the city line, and that the persons named would each give to the Society a block, making the number of acres referred to.

"The offer of Messrs. Kent and Langley, was without any conditions, except the faithful performance of the Society, to create a Botanical Garden, and the grounds to be used for no other purpose. Whereas, Mr. Hunt insisted upon its being made a stock company, and that the ground should be completely enclosed by a costly iron fence. After considerable preliminary discussion, the proposition of these gentlemen was accepted by the Society. As

Mr. Hunt would not depart from its being a stock company, there appeared to be no alternative but to comply with his requirements. The Society deemed that they were not united for such a purpose, and it was therefore proposed to alter the title of the 'Act' before the Legislature, so as to read 'The Hunt Botanical Garden,' and to surrender the same to a Board of Trustees, to be appointed by the incorporators. This course was unanimously adopted by a 'resolution' of the Society.

"The Society felt fully justified in the course they had adopted, believing that it would be more successfully carried out by those to whom they had transferred the power. Thus terminated the action and control of this Society, and the subscriptions obtained by the Society, were placed at the disposal of the new Association. It now rests with that incorporated body to give such enlightenment as the Society and the subscribers to the stock of the garden, have a right to require. And I have no doubt but the Trustees will present, to all interested, a full and impartial history of their proceedings, as soon as they are in a position to accomplish it.

"It is useless to disguise that blighted hopes and disappointed expectations, have thrown their shadows over the once-brilliant enterprise, which was so well calculated to become one of our city's most beautiful adornments, as well as most pre-eminently useful in aid of botanical research, and it must be a source of deep regret to all who feel a deep and abiding interest in the improvement and character of our rapidly-advancing city, with a population of full two hundred thousand. To what have we to direct the distinguished visitors, as matters of art and genius? We have our Greenwood, and when the stranger casts his eye over this most beautiful abode of the dead, he is ready to return satisfied that he has seen all worthy of special notice in the third city of the Union, except what the most bountiful hand of Nature has most liberally bestowed upon us.

"And yet we cannot say that public spirit has no altar where the love of botany and horticulture are enshrined, as long as we have such names to gild our page, as Stranahan, Langley, Sandford, Maxwell, Towt, Dunham, Cruikshank, Kent, Smith, Perry, Spencer and Litchfield, who have shown by their public munifi-

cence that they were ever ready to sustain this most noble enterprise, and as long as they live, our motto will be *'nil desperandum.'* Vacillating influences, more deadly than the assassin's dagger, have not reached the heart of this enterprise, it has only rent its mantle. Its great source is far beyond man's vengeance, or human weakness and folly. The seed is sown, and years may pass away before we see it accomplished in all its beauty, but it will reach its end and high destiny, like the proud oak that rises above the storm to battle with the clouds."

Over half a century elapsed before the rent garment was made whole again—before a movement for a botanic garden in Brooklyn met with success in the establishment, in 1910, of the present Brooklyn Botanic Garden.

C. Stuart Gager

DISPLAY OF PERENNIAL ASTERS

The collection of perennial asters secured in England last year by Mr. Free, Horticulturist of the Botanic Garden, made a beautiful and popular effect while in bloom during late August and September. There are about 75 varieties represented, ranging in color from purple and blue to pink and white. The plants were secured from Aldenham House Gardens, near London, the country estate of the Hon. Vicary Gibbs, son of the late Lord Aldenham. They were set out last fall in a specially prepared bed bordering the east side of the walk along the border of the experimental garden. The forms include varieties of *Aster novae-angliae* (New England aster), *A. novi-belgii* (New York aster), and *A. Amellus.*

It is interesting to note that English horticulturists have paid particular attention to the cultivation and hybridization of our native asters. The collection at the Brooklyn Garden is a good illustration of what has been done in England along this line. Most of the varieties were derived originally from American stock; a few, however, come from the European and Asiatic species, *Aster Amellus.*

One of the plants, near the north end of the row, deserves special mention because it may eventually prove to be the progenitor of

a new race of yellow asters. The ray flowers are yellow—a most unusual color for an aster. It is a hybrid derived from *Aster Linosyris,* a European species, and has been named *Aster hybridus luteus.* These yellow "asters" are now, by most botanists, separated from the genus *Aster* under the generic name *Linosyris.* It would be a long step from this plant to a handsome cultivated yellow aster, though, perhaps, no longer than from the wild grape to the luscious Concord, or from the wild rose to the beautiful Marechal Niel. There is no doubt that possibilities for plant breeders are latent here.

Plants of the yellow-flowered "golden aster," referred to the genus *Chrysopsis,* have come into bloom in the Local Flora section of the Brooklyn Botanic Garden annually for several years.

Our native asters, lavishly displayed all about in woods and fields, every autumn, deserve more attention from local plant lovers. Their cultivation is easy, and they improve greatly under domestication. If it is desired to multiply some particular variety, propagation is readily effected by division of well-grown rootstocks or even by cuttings, for in this case it is unsafe to trust to seed.

The much cultivated China aster, raised from seed each spring, is not a true aster at all; yet many people have this in mind when speaking of asters. It is a form of *Callistephus hortensis* (or *chinensis*), a native of China, and, like the chrysanthemum, has proved to be capable of remarkable variations. The true asters belong to the genus *Aster,* and are for the most part perennial, their rootstocks remaining alive underground through the winter from year to year.

FALL LECTURES

The following lectures comprise the fall course of free public lectures for adults:

1. *October 7*—A Garden Pilgrimage in England. Mr. Montague Free, Horticulturist, Brooklyn Botanic Garden.

2. *October 14*—The Origin of Cultivated Plants. Dr. Orland E. White, Curator of Plant Breeding, Brooklyn Botanic Garden.

3. *October 21*—Four Seasons in the Garden. Mr. Leonard Barron, Editor of the Garden Magazine, Garden City, L. I.

4. *October 28*—Health and Disease in Plants. Dr. Arthur Harmount Graves, Curator of Public Instruction, Brooklyn Botanic Garden.

NOTES

Prof. John W. Harshberger and a class of fourteen students of botany in the summer session of the Biological Laboratory of the Brooklyn Institute of Arts and Sciences, Cold Spring Harbor, Long Island, inspected the laboratories, library, conservatories, and plantations of the Botanic Garden on Saturday, July 8, 1922.

Sixteen species and varieties of *Lilium* came into bloom during late June, July, August, and September on Azalea Knoll near the Malbone Street entrance. Among those that attracted much public interest and comment was *Lilium longiflorum* var. *Takesima,* resembling and closely related to the Easter lily of the florists.

At the Thirteenth Annual Convention of the Northern Nut Growers' Association, at Rochester, N. Y., September 7–9, Mr. Willard G. Bixby, a member of the Botanic Garden, gave two papers, one on "Improved varieties of nuts ready now for northern orchards," and the other on "Varieties." Mr. Bixby is treasurer of the Association.

Recent visitors to the Garden include: Mr. William G. Lobjoit, Controller of Horticulture, London, England; Dr. Cecil Yampolsky, New York City; Prof. Takewo Hemmi, Kyoto Imperial University, Japan; Dr. Aniela Kozlowska, Cracow, Poland; Miss Anne Allston Porcher, Charleston (S. C.) Museum. Miss Porcher has charge of the children's work in the Charleston Museum.

Seventh Annual Ice Cream Party of the Boys' and Girls' Club.—The boys and girls who have had gardens in the Children's Garden during the season just closed—about 200 in all—held their annual ice cream party at the Garden on Saturday morning, September 9. After a sleight-of-hand entertainment by one of the boys in the Auditorium, John Wille, this year's recipient of the

Alfred T. White Scholarship, presented two books on horticulture for the library in the club room of the Boys' and Girls' Club. Mr. Wille has entered the class of 1926 at Cornell University.

Big Tree Contest.—Last spring the Botanic Garden offered three cash prizes for records of the largest trees now growing on Long Island. Over 300 records, some of which are duplicates, were submitted by about 200 contestants. Full details of the contest, which closed on August 31, 1922, have been published in Brooklyn Botanic Garden *Leaflets* for October 4, 1922. The records are serving as the basis of a study to ascertain the conditions which have combined to produce these big trees, and the result of the study will be embodied in a forthcoming Memoir by Mr. Norman Taylor, curator of plants, on "The Vegetation of Long Island." There was a double tie for second prize. The awards were as follows:

First prize for a Sycamore tree (24 feet in circumference) on the property of James N. Hill, Wheatley Hills, awarded to Herbert Simonson, of Glen Head.

Second prize for a White Oak (19 feet 7 inches in circumference) on the farm of Paul Costermale, Stony Brook, divided among C. P. Miller, of Stony Brook; C. C. Gregson, of Setauket, and Harold Smith, of Setauket, all of whom measured the same tree on March 11.

Third prize for a Sycamore tree (18 feet 4 inches) on the E. J. Brennan place, St. James, awarded to Miss Julia Woodhull Otto, of Sayville.

Visit of Japanese Sailors.—On the afternoons of September 27 and 28 about 350 Japanese officers and men visited the Japanese Garden and other parts of the Botanic Garden. These officers and men are to form the first crew of the new oil tanker "*Kamoi*" built for the Japanese Navy at Camden, N. J. The "*Kamoi*" was launched the latter part of July, 1922, and finished about September 1. She will sail for Japan on her maiden voyage under command of Captain T. Murase.

The first fall meeting of the City Gardens Club, Miss Frances Peters, President, was held at the Brooklyn Botanic Garden on

Tuesday, October 3, at 3 p.m. After the regular business session the members inspected the buildings and plantations under the guidance of Dr. Gundersen.

The first fall meeting of the Department of Botany of the Department of Education of the Brooklyn Institute of Arts and Sciences, Dr. George C. Wood, President, was held in the Laboratory building of the Botanic Garden on Tuesday evening, October 10. The program was a lecture by Dr. O. E. White, of the Brooklyn Botanic Garden staff, on "Economic Plants of the Bolivian Indians." The formal session was followed by a social hour with refreshments.

The *Inventory* of seeds and plants imported by the Office of Seed and Plant Introduction (U. S. Department of Agriculture), No. 57 (May 20, 1922), contains the statement that "there are ten times as many undiscovered useful plants remaining in the Tropics today as are to be found in the colder regions of the globe." The writer also reminds us that "the plants which grow in the colder regions are those which have, by slow adaptation to the cold, crept out of the Tropics."

On October 5, at noon, Dr. A. H. Graves gave an illustrated talk on the Brooklyn Botanic Garden before the Federal Board students at the Central Branch of the Y. M. C. A., at 153 East 86th Street, Manhattan.

The Junior class of the Library School of the New York Public Library, comprising about 33 students, made its fourth annual visit to the Botanic Garden library on the afternoon of October 6, 1922. The class was accompanied by Miss Edith W. Tiemann. The Botanic Garden librarian, Miss Simpson, gave a talk on the organization and work of the library, and Director Gager spoke on the educational work of a botanic garden and its articulation with the Brooklyn Public Library and its branches. Tea was served in the exhibit room.

The ninth annual Children's Garden Exhibit for the boys and girls of the Borough of Brooklyn was held on September 29 and 30. The exhibit showed several new and interesting features this year. First among these was the number of small exhibits from individual schools. In years past a number of the schools have

sent mammoth exhibits which have been remarkable from the standpoint of display. This year more schools entered, but with smaller exhibits from each school. This makes a more interesting but less effective exhibit. The object of our work is to create a wide interest in the work. There were also a great many individual exhibits, a few boys and girls from schools all over the Borough bringing in their own products rather than massing them with school exhibits.

A new class for entry this year was Class B, the Small-School Display, over against Class A, which represents the large-school exhibit, or the exhibit of many products from a given school.

The nature of the prizes was somewhat changed. Heretofore silver cups have always been presented as second prizes, but this year nature books were given. The trophy in Class A, School Display, was won last year by P. S. 89 and became the permanent property of that school. This year the new trophy for Class A was also won by P. S. 89. In Class C, Window Box Display, the prize, which is a large gold bronze cup, was won both last year and this by P. S. 49. This prize must be won three times by one school before it belongs to the school.

The judges of the exhibit this year were Mr. Robert J. Potter, Garden Supervisor of West Orange, New Jersey; Miss Nellie S. Truman, Director of Brooklyn Girl Scouts, and Mr. Montague Free, Horticulturist of the Brooklyn Botanic Garden. The display was set up on Friday morning and judged Friday noon, when it was thrown open to the public.

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The Botanic Garden is open free to the public daily from 8 a.m. until dark. On Sundays and Holidays at 10 a.m.

Entrances.—On Flatbush Avenue, near Empire Boulevard (Malbone Street), and near Mt. Prospect reservoir; on Washington Avenue, south of Eastern Parkway and near Empire Boulevard; on Eastern Parkway, west of the Museum Building.

The street entrance to the Laboratory Building is at 978 Washington Avenue, opposite Montgomery Street.

A Docent will meet parties by appointment to conduct them through the Garden. This service is free to teachers with classes, and to members of the Botanic Garden and to their friends when accompanied by members. No trips will be taken with parties of less than six adults. For schedule of regular trips consult the *Prospectus*.

To Reach the Garden take Broadway (B.R.T.) Subway to Prospect Park station; Interborough Subway to Eastern Parkway-Brooklyn Museum Station; Flatbush Avenue trolley to Empire Boulevard; Franklin Avenue, Lorimer Street, and Tompkins Avenue trolleys to Washington Avenue; St John's Place trolley to Sterling Place and Washington Avenue; Union Street and Vanderbilt Avenue trolleys to Prospect Park Plaza and Union Street.

PUBLICATIONS

OF THE

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RECORD. Established, January, 1912. An administrative periodical issued quarterly. Contains, among other things, the *Annual Report* of the directors and heads of departments, special reports, announcements of courses of instruction, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Garden. To others one dollar a year; 25 cents a copy.

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18. *Inheritance of endosperm color in maize.* 11 pages. 1917.

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28. *Botanical exploration in Bolivia.* 13 pages. 1922.

LEAFLETS. Established, April 10, 1913. Published weekly or biweekly during April, May, June, September, and October. The purpose of the *Leaflets* is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Free to members of the Garden. To others, fifty cents a series. Single numbers 5 cents each.

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